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HELIOTHERAPY IN SURGICAL TUBERCULOSIS.[1]

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Of those who advocate the employment of heliotherapeutic measures in the treatment of surgical tuberculosis, few have been as enthusiastic and convinced as Dr. A. Rollier of Leysin. He has long urged the value of sunlight in these cases, and his writings, supported by his experience and the brilliancy of the results he has achieved, have drawn considerable attention to the methods he employs, and stimulated many to attempt their imitation. Rollier claims that high altitude in such a locality as Leysin is essential if the greatest benefit is to be obtained from insolation. He asserts that the following factors found in such situations are of the greatest importance: Low atmospheric pressure, infrequency of winds, marked dryness of the atmosphere, inconsiderable or transient fog, very low rainfall, prolonged duration of sunshine, a high actinic value of sunlight (augmented in winter by the reflection due to ice and snow), intensity of heat-rays, and pure air of high radio-activity.

[1] This article is based upon Dr. A. Rollier's monograph, "Die Heliotherapie der Tuberkulose mit besonderer Berücksichtigung ihrer chirurgischen Formen," a review of which appeared in the last number of this journal (p. 44).

We are indebted to the courtesy of Dr. Rollier for permission to reproduce in the BRITISH JOURNAL OF TUBERCULOSIS the following abstract of his important monograph. We would refer those specially interested in this method of treatment to the brochure in question, as it contains a full statement of the author's views, arranged under the following headings: (1) General Principles and Experimental Observations; (2) Technical and Clinical Observations; (3) Roentgen Control of Results; (4) Statistics; (5) Climatology; (6) Conclusion. Limitations of space preclude us from giving a very extended or critical résumé, and our remarks will be principally confined to the more important practical details.

While Dr. Rollier strongly advocates insolation at a high altitude, he emphasizes the importance of sun treatment in any locality, even though it cannot be practised under the ideal conditions existing at Leysin. He pleads for greater consideration being given in all hospitals to the beneficial effects of combined air and sun treatment, and urges that every opportunity for its employment, particularly in the case of children, should be taken. He concludes by quoting Michelet's poetic plea: "The human flower is, of all flowers, the flower which most needs the sun."

General Principles and Experimental Observations.

Successful results from heliotherapy at high altitudes are largely ascribed to the influence of ultra-violet rays. Skin pigmentation is asserted to be due to these rays, their energy being absorbed and transformed into chemical energy, which effects the deposition of pigment. The strongly absorptive character of the ultra-violet rays has been confirmed by recent exact observations of R. A. Hasselbach. The question of pigment formation represents one of the fundamental problems of biology. The theories regarding its origin are discussed. Pigmentation is stated to have, firstly, a protective rôle, for when once it is established erythema can no longer develop, and the short-wave rays have no further destructive influence on the skin; secondly, the pigment represents a "transforming agent," in the sense that it transforms the shorter-wave rays into rays of greater wave-length; and, thirdly, this factor of pigmentation permits the deep penetration of the long-wave rays. Wieszner has demonstrated that the long-wave red, and particularly the infra-red, rays possess strong bactericidal properties and have the greatest penetration capacity. The bactericidal power of light is enhanced by the inflammatory response of the tissues to insolation.

There is an intimate therapeutic collaboration between high altitude and solar radiation, as shown by multiplication of erythro-

cytes and increase in hæmoglobin. According to Bardenheuer, there is a marked total increase in the leucocytes, in mild "closed" cases of tuberculosis the figure being typically 13,000.

Rollier has investigated the effect of light on the vital processes of respiration and circulation, and finally asserts that the psychological condition is greatly improved through the sun's genial influence, and that the body acquires a greater working capacity.

Technical and Clinical Observations.

Rollier contends that a ten years' experience of heliotherapy justifies the statement that by this method every form of surgical tuberculosis may be healed, even cases of the most severe type and at every age.

It cannot be too strongly emphasized that the conception of surgical tuberculosis as a local disease, demanding local treatment, is quite inadmissible in the present stage of knowledge. Of all the infective diseases, tuberculosis is pre-eminently the one where the soil in which it occurs is of the most profound significance. Only such treatment deserves to be called rational where the aim kept steadily in view is the repair and the regeneration of the whole system. Heliotherapy would appear to fulfil this condition. Both as regards general and local treatment, heliotherapy is shown to offer the most powerful tonic.

The skin has other functions besides that of elimination. Above all, it has an absorptive potentiality. Apart from the absorption of oxygen, the absorptive capacities of the skin in helio- and aero-therapy are very great, though as yet only partially estimated with any degree of exactness. To this capacity is attributed the striking results attained by the constant contact of the whole body with the air and sun.

The first necessity on the admission of patients for heliotherapeutic treatment is to free them from coverings and confining apparatus, and to restore the light to their atrophied limbs and to the insufficiently nourished and often œdematous, and even fungous, tissues. By observing a systematic and strictly individual procedure, patients are gradually accustomed to living out in the open mountain air, and trained to tolerate prolonged exposure to the sun. It is only by observing the minutest precautions in this direction that disappointments in heliotherapy are forestalled, and effective dosage without untoward results is successfully achieved. In no circumstances is a new patient permitted to begin his solar treatment during the first few days after his arrival. According to the severity of his disease and the personal equation of his resistant powers, three to ten days may elapse before he is ripe for initiation to heliotherapeutic treatment.

The patient begins his stay at the sanatorium with a period of quiet

rest in bed, the graduated opening of windows and doors training him to tolerate prolonged contact with high mountain air. After this the air cure first is adopted. For this purpose the patient's bed is wheeled out into the gallery communicating with his room, to which air and sun have free access—one hour the first day, two hours the second day, and so on, but no insolation proper as yet. During this period regular measurements of temperature, pulse, and respiration are recorded, and the blood and urine tested. The real heliotherapy is only proceeded with when it is perfectly certain that the stay in high altitude is borne without producing embarrassment of any description.

At his first appearance in the "solarium" the patient is clothed in some white material, his head being protected with a white stuff hat or by an umbrella affixed to his bed, and he wears a species of snow spectacles. Irrespective of the localization of the disease, insolation is always inaugurated at the lower extremities. In this way an overhasty application of insolation and its consequences are avoided. Congestion, giddiness, and exaggerated local reaction are obviated. On the first day, only the feet are exposed, and only for five minutes at a time, for three or four times, with an hour between each exposure. On the second day the legs are included as far as the knee. On the third day the treatment advances as far as the groin, taking in the whole thigh. On the fourth and fifth days the abdomen and hypogastrium are included in the exposed area. During this stage it is an advantage, with adults, to lay a wet compress over the cardiac region, but seldom necessary with children. When possible, the patients are disposed in bed, abdomen downwards, and the back of the body is treated in the same way. The insolation of both surfaces, therefore, is a matter of seven to eight "steppages." Finally, about the sixth or seventh day the exposure may extend to the neck and head. As pigmentation advances, the precautions, at first so essential, become superfluous, and a daily insolation of four to six hours is arrived at, which is borne by patients of all ages, both in summer and in winter, without the slightest discomfort, but rather creating a sense of well-being.

The above scheme is by no means a rigid one. No method calls for greater care or for greater elasticity in applying the treament to individual cases. The dosage of sun depends not only on the general bodily response, but also on the local reaction. These local, or focal, reactions differ in intensity and vary according to the activity of the tuberculous processes. For instance, patients with pyrexia, and especially those threatened with generalized tuberculosis, exhibit a marked reaction at the initial insolation of the lower extremities. Only a mature experience can prescribe the correct dosage in such cases, while any overstepping of the line of tolerance not only affects the focus of disease, but also the general system, producing increase of

temperature, quickened pulse, lassitude, insomnia, and loss of appetite. To obviate the aggravated congestion and intensified inflammation that would certainly ensue, acute inflammatory lesions are not solarized at once. Just in these cases the insolation of the feet acts as an excellent pioneer.

The reaction phenomenon is the guide to the duration of exposure. That degree of reaction is aimed at which will act most beneficially both on the focus of disease and on the whole organism, without in any way diminishing the resistance of the latter. This knowledge can only be gained through long clinical experience.

During the course of the treatment the skin acquires a bronze tint which gradually deepens from copper to chocolate. Great importance is attached to the bronzing of the skin as an index of improvement. It stands almost invariably in direct harmony with the progress of the patient. The rate at which it is effected allows a trustworthy prognosis to be made. It is found that pigmentation bestows a special resistance upon the skin, and often renders it immune to bacterial infection. For instance, no pigmented skin becomes the seat of acne or furunculosis.

During the earlier period of sun treatment, when plaster bandages were still employed, these enabled interesting comparisons to be made. An epidemic of chicken-pox sometimes followed the admission of a patient, and it was observed that, though the vesicles would crop up in parts of the skin that were blanched through being covered by plaster bandages, the pigmented portions were never invaded. Thanks to their pigment layer, patients do not feel cold when, even on sunless days, they remain uncovered in the free mountain air. Solar treatment, thus conducted, avoids the occurrence of erythema solare, with consequent dermatitis. There is only slight reddening of the skin at first, followed by progressive pigmentation. Unpleasant sensations of heat are unknown to the patients.

Specialized Application of Heliotherapy.

In cases of tuberculous arthritis strict immobilization should be combined with insolation. The patient is strapped down in a corset on a specially-constructed bed. For insolation of the back in spinal caries, the patient is immobilized while ventrally recumbent, and a hard, wedge-shaped pillow is placed under the chest and arms. By moving the pillow appropriately, a lordosis is produced which can be augmented, and in this way even marked dorsal and lumbar protuberances may be corrected. The natural inclination of the ventrally recumbent patient to raise his head and use his hands tends to make him involuntarily correct his own deformity, and at the same time exercises the dorsal muscles. Cold abscesses spontaneously absorb.

Sinuses respond well to heliotherapy, and close up quicker than by any other method.

In hip disease insolation is combined with fixation of the trunk and extension of both legs. Sinuses show rapid improvement, provided there is no amyloid degeneration, and spontaneous return of movement in the affected joint may be anticipated.

In tuberculous disease of the knee-joint, combined heliotherapeutic and orthopædic measures are employed. Pain is rapidly alleviated, and œdematous conditions quickly improve, with closure of sinuses. Systematic active contraction of the quadriceps femoris muscle is enjoined, to stimulate the muscular development of the thigh. Cases of true gonarthritis, with destruction of the bone and cartilage, do very well; but cases where the joint capsule is thickened, though apparently less severe, are more resistant to treatment.

In tuberculous disease of the ankle, a right-angle foot-splint is employed to counteract the tendency to equinus. Immobilization and elevation of the limb, together with heliotherapy, relieve the circulation and secure rapid disappearance of pain and periarticular swelling. As soon as pain is relieved, the patient is permitted to make careful and progressive attempts at joint movement. Essentially similar principles are employed in the treatment of other joints. Spontaneous extrusion of sequestra in diverse localities has been observed, and this is followed by rapid healing. The use of bandages is avoided as much as possible. With freely discharging wounds, sterile dressings are applied at night only.

In tuberculosis of the shoulder-joints, Rollier considers that immobilization is not indicated, as the weight of the dependant arm acts as a natural extension. In certain cases he advises additional extension as well. In elbow and wrist tuberculosis, a celluloid splint is recommended, which may be removed during insolation. Development of muscle and restoration of the functions of the joint is obtained in the majority of cases.

Sacro-iliac disease is said to be relatively common, and when of the closed type its course is of a benign character. The occurrence of sinuses makes prognosis very unfavourable. The patient is placed in a ventrally recumbent position, and improvement is then said to take place rapidly. It may be laid down as an axiom in the heliotherapeutic treatment of sinuses of every kind that the essential condition of success is their continuous exposure to air and sun. Injections in sinuses are not favoured, and endeavours are made to prevent the closing of the outlet of the sinuses. Sunlight is bactericidal without being, like a disinfectant, destructive to living cells. After each period of insolation a healthy reaction in the sinus persists; pus, containing crumb-like particles, necrosed tissue, and often bone

sequestra, ranging in size from particles as small as grains of sand to entire small bones (*e.g.*, naviculare pedis) are extruded. Spontaneous extrusion of sequestra is often noted in the most diverse localities. The wounds then rapidly become replaced by healthy granulation tissue and the sinuses heal. The process is as follows: A freely suppurating sinus shows a small black spot in its recesses resembling a coagulum. This increases in size, and, pushing the sinus walls apart, travels towards the surface, having the appearance of a stone set in a ring. The colour is now a dirty grey or a reddish-black, the margins are irregular, and the whole is said to resemble a small piece of coal. Gradually, and without discomfort, the sequestrum loosens from its surroundings and is extruded. Should the insolation be interrupted by unsuitable weather, the sequestrum, though apparently on the point of being expelled, slips back again into the depths of the sinus; and this is regarded as evidence of the effect of the sunlight in promoting the process of elimination.

In intestinal tuberculosis, and tuberculosis of the urino-genital system, the results are said to be encouraging. Initial success in all these cases is shown by the alleviation of pain, the analgesic action of heliotherapy being very marked. Often such morbid conditions as double tuberculosis of the kidneys improve, and tumours which were of the size of a closed fist dwindle, while caseous matter softens and liquefies. Permanent benefit is said to be achieved without operative interference.

In cases of tuberculous peritonitis and salpingitis the majority of patients arrive for treatment in a cachectic condition, with pyrexia and generally unfavourable symptoms. Many show other tuberculous manifestations, and others have relapsed after operative treatment. Sometimes their condition suggests amyloid change. The treatment frequently results in a reduction of temperature during the acclimatization period. As might be expected, the pure exudative form of peritonitis in most cases gives rapid and satisfactory results. As the abdominal distension decreases, the digestive functions improve, assimilation becomes more efficient, and the body gains in weight. Cases with fibrous adhesions obtain rapid and permanent benefit. From the patients' point of view, the subjective sensation of disappearance of pain represents the most important benefit. All Rollier's patients who suffered from peritonitis with caseous degeneration had already been operated upon, and the scars had usually given away. These caseous forms, which exercise a strong tendency towards ulceration, offer a less favourable prognosis, but good results have often been obtained even with these. The caseous matter softens, and the liquid pus escapes through the sinus. The abdomen becomes softer, smaller, and loses its nodular character. Tuberculous tumours

in the ileo-cœcal region do well, and quite large ones are said to shrivel up. Some cases of rectal fistulæ were cured with a formation of sound scar tissue. Encouraging results were obtained in cases of tuberculous salpingitis. The analgesic influence of the treatment was marked, but very careful individual dosage is indicated. Early treatment is especially strongly advocated here.

Insolation is recommended in tuberculosis of the mucous surfaces of the skin. Insolation of the larynx has been attempted by aid of a reflector with encouraging results.

Tuberculosis of the eye responds well to treatment, and instances are given of cure in cases of conjunctivitis, tuberculous keratitis with ulcers and opacities, tuberculous iritis, and even ophthalmia accompanied by iritis; the cornea clears up, and opacities in the vitreous body totally disappear. Heliotherapy is said to have the advantage of avoiding such sequelæ as meningitis after enucleation, or miliary infection after iridectomy, etc., and the treatment is said not to give rise to photophobia or other disturbances.

In cases of lupus a combination of heliotherapy and Finsen treatment is advocated.

Success is alleged to be invariably obtained in the treatment of tuberculous adenitis by insolation. Either the glands quickly soften—often before a month has elapsed—and entirely disappear after one or two aspirations, or they dissolve spontaneously. The æsthetic effect is good because of the avoidance of scarring, and the tendency to relapse is less marked. Scraping out of the gland cavity is never resorted to. Suppurating glands soon heal, the pus discharges freely, and the sinus soon closes, leaving hardly a visible scar. The most refractory cases are those of polymicroadenitis; but simple lymphomata heal rapidly and satisfactorily. Heliotherapeutic technique in these cases is very simple. The feet are first exposed, and the area to be treated is only gradually attacked. Direct local insolation of the diseased part would expose the patient to the evils of congestion. In order to avoid this, the head is protected with a white cloth having a hole cut in it, to expose the site of the glands. As soon as pigmentation is established, these precautionary measures may be abandoned. After from two to four hours' insolation in the morning, patients are able to go about for the rest of the day with bare necks. In contrast to these rapid cures stand out cases of multiple glandular swellings in the neck, without suppuration. These make no progress for from three to four months, and the neck circumference shows no diminution. Then suddenly the hardened mass softens, the neck becomes smaller, and this phenomena is accompanied by malaise, headache, slight pyrexia and shivering. All these symptoms subside in a few days. Tracheo-bronchial glands, in spite of their deep-seated locality, are

favourable cases for treatment. The general health simultaneously shows great improvement.

The prophylactic value of heliotherapy in pretuberculous cases is commented upon and advocated by Rollier.

Equally encouraging results are reported in most other forms of surgical tuberculosis. Insolation is stated to be of a special value in tuberculous adenitis, and details are given of heliotherapy in tuberculous peritonitis, intestinal tuberculosis, tuberculous disease of the urogenital system, etc.

Dr. Rollier has almost abandoned the employment of tuberculin, but in the prolonged absence of sunlight favours radiotherapy.

Roentgen Control.

Dr. Rollier emphasizes the necessity for X-ray control, and states that the absolute need for individualization becomes thereby more apparent as experience ripens. Skiagrams show that morbid changes have a greater distribution than was supposed, and the progress of infection covers a wide range of variation, depending on the initial virulence of the infective agent, its localization, and the personal equation of the patient. Clinical signs disappear long before the skiagram shows the complete healing of the local lesion.

The characteristic points of the Roentgen findings are, primarily, *destructive ;* secondarily, *reconstructive*. With the former is noted early marked and extensive atrophy, and a transparency due to deficiency of lime salts. There are structural changes : " rarefactions," lacunæ, reticulations, cavities, caseous foci with subsequent suppuration, and often typical local sequestra. Externally there are alterations in form which modify the relations of neighbouring parts of the skeletal system.

Healed bone tuberculosis is characterized by (1) disappearance of atrophy, healthy, often exaggerated, lime salts content (sclerosis); (2) reparation of structure; (3) sharp demarcations; (4) regenerative processes—*e.g.*, formation of osteophytes, nearthroses, and remoulding of existing joints; (5) absorptive phenomena.

Skiagrams at the beginning of the disease give no indication of subsequent development, individual variations amongst cases coming under the same category being very numerous. As a definite factor on which to base a prognosis, initial atrophy can alone be relied upon, and then only with the aid of a series of skiagrams taken at definite intervals. Synovial forms of hip or knee tuberculosis may heal without leaving a trace. In tuberculosis of the soft tissues nothing special is to be discerned beyond changes of volume and differences in the intensity of shadows.

The following table gives some general idea of the number of cases dealt with at Leysin, with the results attained:

TABLE REPRESENTING SUMMARY OF STATISTICS OF 1,129 CASES TREATED AT LEYSIN, COMPRISING 652 ADULTS AND 477 CHILDREN.

	Total.	Cured.	Improved.	Stationary.	Died.	Deaths. per Cent.
Closed tuberculosis (on arrival) ...	804	703	73	22	6	0·74
Open tuberculosis (on arrival) ...	325	242	39	19	25	8·00

It would not become us, in availing ourselves of Dr. Rollier's courteous permission to reproduce the main points of his work, to criticize in detail his methods. Without, however, detracting in any way from the value of his work, and while, indeed, applauding his enthusiasm for a method of treatment with which his name is inseparably associated, we cannot agree with him in all of his assertions, and some comment is called for. A prolonged trial of insolation at Alton, combined with a short experience of artificial heliotherapy, has convinced us of its value. That heliotherapy, however, is the secret of success in the treatment of surgical tuberculosis, even if undertaken under the favourable conditions available at Leysin, we most strenuously deny.

When we compare the results of treatment with approximately the same number of cases at Alton, and find that the mortality under the cloud-strewn English skies is (including traceable discharged cases) under 2 per cent., we cannot regard heliotherapy as the most important factor in treatment. When, further, we find that out, of a total mortality of thirty-one, four-fifths occurred in children, giving a percentage of deaths, amongst children treated at Leysin, of approximately 5 per cent., the conviction that the value of heliotherapy should not be unduly exaggerated becomes greater.

If, however, we consider the ordinary figures given for bone and joint tuberculosis, we find the mortality estimate by many authorities is stated variously as from 20 per cent. to 50 per cent. What can explain these variations? In our opinion, the low mortality is due to the fact that rigorous conservative methods are employed at Leysin and Alton, and that the success of both is attributable to their adoption. Heliotherapy is an adjuvant to treatment, and as an aid to treatment is of the greatest value; but the indications for its employment and its limitations should be very clearly recognized. One fact in Dr. Rollier's figures is of extraordinary interest, and that is the amazingly low

mortality amongst adult cases. Further explanations of this will be awaited with interest, but we do not think that successful insolation can be more than a contributory cause.

Heliotherapy appears to have its greatest field of usefulness in the treatment of septic cases, and the functional results which follow its employment are often undoubtedly good. Further comment is uncalled for at this time, but it is to be hoped that in this country greater use will be made of heliotherapeutic measures in appropriate cases; that radical measures will not be hastily resorted to; that treatment in towns will be abandoned for treatment in the country or at the seaside, where feasible; and that, above all, the value of all that is implied by the term "conservative treatment" will be more thoroughly appreciated and investigated. Dr. Rollier's work is of the highest importance in directing attention to rational conservatism aided by heliotherapeutic measures.

THE PROGRESS OF THE ANTI-TUBERCULOSIS MOVEMENT.

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In introducing the National Insurance Bill, the Chancellor of the Exchequer estimated that there were in this country between four and five hundred thousand persons suffering from consumption; he stated that 25 per cent. of the money spent by the Foresters Society in sick pay was due to this disease, and that it was the cause of 75,000 deaths annually. Within recent years tuberculosis has spread from the town to the country, and we may see the havoc wrought by it among the cottagers in Scotland and Ireland, a class which formerly enjoyed remarkable freedom. Consumption attacks especially young adults just when they are most valuable to the community. When the father or mother of a young family breaks down with tuberculosis, the social injury resulting far exceeds the mere loss of life. It is said that one out of every three deaths among males between the ages of fourteen and fifty-five—that is, during the best working period—is due to consumption. The burden of invalidism, moreover, may be even a greater social evil than death itself, and we must add to this the impaired efficiency caused by crippling from tuberculous diseases of bones and joints occurring in

childhood. Finally, we cannot leave altogether out of account, in considering the injury caused by this disease, disfigurement such as is due to lupus and the scarring which follows extensive glandular abscesses, although we may not be able actually to assess the damage in pounds, shillings, and pence.

Past and Present Attitude to the Disease.

We may be surprised to find that in past days these evils resulting from tuberculosis were borne so patiently by our predecessors, and without any systematic effort to get rid of them, although there is reason to believe that the forms of tuberculous disease were then even worse than they are at present. But the conception that disease is preventable is one that took its origin only in modern times. It must also be remembered that it is only since Koch's discovery of the tubercle bacillus in 1882 that we have known what should properly be called tuberculosis, and how many diseases should be attributed to the same microbe attacking different organs and tissues. These vary very much: sometimes they are acute and almost uniformly fatal, as when they involve the membranes of the brain; at others slow in their progress and without danger to life, although the causes of destruction of tissue and disfigurement, as in lupus of the face. Pulmonary consumption occurs in many forms and degrees, but we have also tuberculosis in spinal disease, in hip-joint disease, in white swelling of the knee, in strumous glands, and consumption of the bowels, all caused by the tubercle bacillus and grouped under the name of "tuberculosis."

The Infective Nature of Tuberculosis.

Bygone views excluded the notion of the transmission of the disease from the sick to the healthy. In earlier times this had been recognized, and the belief has always lingered in the popular mind of Southern Europe; but academic medicine scouted the idea. Yet Laennec himself died of phthisis caused, there is reason to believe, by having inoculated himself at the post-mortem examination of a tuberculous patient. The successful inoculation with tubercle of a man who was dying from gangrene for which he had refused amputation, by three Greek physicians, Demet, Paraskeva, and Zallonis, and the publication of many remarkable cases of the communication of the disease from husband to wife, from mistress to maid, from patient to nurse, or the very remarkable instance where a phthisical midwife communicated the disease to a long series of babies nursed by her, or the experiments upon animals by making them inhale a solution of phthisical sputa, failed to alter the attitude of the profession to this question. At length the demonstration of the tubercle bacillus and the transmission of the disease to animals

by means of a pure culture, separated by scores of generations from the original source, forced the most sceptical to admit the possibility at least of its being communicable; but even then it was regarded as unusual, and so late as twenty years ago I remember being told that the proposal to install an apparatus at Brompton Hospital for the destruction of phthisical sputa met with most determined opposition from a senior member of the medical staff. It was argued that, if this view were true, the nurses and the staff of Brompton Hospital ought to have shown a high rate of disease, but it was claimed that in the fifty years that had elapsed since the foundation of the hospital nothing of the kind had been noticed.

The old general hospitals throughout the country treated a large number of consumptive patients as out-patients, but usually excluded them from the wards by a special notice on the tickets of admission. This was due neither to neglect nor to indifference, but experience had shown that these patients did badly inside the hospital, and this truth had been recognized, although the proper principles of treatment were by no means grasped. It was not until 1841 that the Brompton Hospital for Consumptives was founded, and outside London it was only in 1869 that the Ventnor Hospital was started.

The Evolution of Open-Air Treatment.

The proper principles of treatment had been taught by Dr. George Bodington, of Sutton Coldfield, as early as 1830, but made little way with the medical profession and the general public; not only in consumption, but in many other morbid conditions, the value of fresh air was not quickly grasped.

In the "Life of Florence Nightingale," there is a letter from the Crown Princess of Prussia, afterwards the Empress Frederick, dated September 29, 1866, in which she writes: "As you are such an advocate for fresh air, I cannot refrain from telling you what I have myself seen in confirmation of your opinion on the subject. . . . In a small well-kept hospital, where wounded soldiers had been taken care of for some time, the wounds in several cases did not seem to improve; the general state of health of the patients did not show any progress. They were feverish, and the appearance of the wounds was that of the beginning of mortification. In the garden of the hospital there was a shed or summer-house of rough boards with a wooden roof. The little building was quite open in front, and on the other two sides closed up with boards, but with an aperture of 2 feet all the way under the roof, so that it was like being out of doors. Six patients were moved down to this shed, sorely against their will, as they were afraid of catching cold. The very next day they were better; the fever left them, the condition of the wounds became healthy; they enjoyed their summer-

house in spite of two storms that knocked down the tables, and all quickly recovered. I had seen them upstairs, and saw them every day in the garden. The difference was incredible."

In spite of this example, it was thirty years or more before the value of fresh air began to be generally admitted in the treatment of consumption; but lately there has been a most astonishing progress in the appreciation of fresh air, particularly amongst the younger generation; they have learnt how much pleasanter it is to sleep in a room with the window wide open. Hospitals are now provided with wards entirely opened to the weather; at the Birmingham General Hospital, which was only opened in 1897, and was then supplied at great expense with warm and filtered air, experience has shown that the patients, especially the children, do better if they are allowed to spend most of their time lying outside upon the balconies. I have lived through this change of practice, and I can confess that I should not have ventured to begin these experiments. When the late Dr. A. Foxwell persuaded the Queen's Hospital Committee to give him an open-air ward at the top of the building, I imagined that it would be dirty from coal smoke and wretched from exposure to wind and rain, yet I found that not only patients who were snugly tucked up in bed, but even the nurses who had no extra covering, made no complaint.

Infection and Immunity.

We now know that tuberculosis is caused by a parasite, and there is no doubt that if we could get rid of the tubercle bacillus we should abolish all forms of tuberculosis. We are ignorant, however, of the mode in which these microbes originate—in fact, we know no more of that than we do of the origin of life itself; but the bacillus undergoes certain modifications, shown in the intensity of the disease it produces. And we know, too, that the organism that causes tubercle in human beings differs from that which sets up tubercle in cattle, while that, again, differs from the microbe of tubercle in birds and reptiles. There are differences of opinion as to the extent and importance of these variations; but while it is admitted that the microbe of cattle may cause disease in man, it is believed that that of birds and reptiles is not communicable to him. It is therefore from human beings or cattle affected with tuberculosis that infection is to be feared. This is not in either case usually communicated directly. The tubercle bacillus is quickly killed by exposure to light and air, but is so profusely distributed by the numerous sufferers from consumption that the germs are to be found in all public places and conveyances; every time a patient coughs, even without expectorating, he drives into the air minute droplets of moisture containing myriads of bacilli, so that, although extreme care may be taken to collect and destroy all expectoration, a consump-

tive person remains a constant source of infection. In fact, we who live in crowded communities may well despair to escape all risk of infection, and it is reasonably maintained that few, if any, young people in our great centres of population go free. But if this is so, the resulting lesion must be generally slight and undergo rapid healing. It is probable that, like vaccination, it determines a certain amount of protection, and that most of us owe to this our immunity. We thus see that the protection we enjoy depends upon the very prevalence of the disease we deplore; for when infection reaches a population hitherto free from the disease, they suffer extremely from its attacks, and the rate of mortality may be so high as to threaten them with extinction, as has been the case, for example, among the natives of New Zealand and in other Pacific islands.

Using the jargon of modern pathology, immunity is due to the formation of antibodies which exert their action either on the microbes or on the poisons produced by them. In either case the result is that the symptoms of disease—high temperature, rapid pulse, headache, general pains, and the like—do not occur, and the sufferer feels little, if at all, the worse for the introduction of the microbe; but there are certain people who constitutionally appear unable to form these antibodies, and these are the families in which, as we say, there is a predisposition to consumption.

In other cases the immunity, or power of resistance, may be reduced temporarily by the occurrence of some other disease, of which a common example is the way in which phthisis may attack a person recovering from typhoid fever, a disease due to an entirely different microbe. Or, again, there may be what is called the recrudescence of an old patch of tubercle which was perhaps never recognized, or had been forgotten. It may have been one of those early attacks in childhood which had been apparently healed, but the bacilli had lain dormant until, in consequence of some disturbance, such as an injury or a simple inflammatory affection, the bacilli regain their activity, and a more or less serious attack of tuberculosis is the result.

Milk as a Source of Tuberculous Infection.

Tuberculosis in children undoubtedly bears some relation to tuberculous milk; for, although it is true that they are exposed to many other sources of infection, it must also be allowed that tuberculous milk is chiefly dangerous to young children, of whom it constitutes the principal or sole diet. Milk may be rendered harmless by boiling or sterilizing, and in my opinion it has never been proved that this process in any way impairs its nutritive value; but most will agree that milk should not be sold which contains living tubercle bacilli, and that the use of cows, for milking purposes, which are suffering from tuberculosis

of the udder ought to be prohibited by law. Nothing short of such legislation appears to be likely to be effective. Dr. John Robertson, the energetic Medical Officer of Health for Birmingham, has introduced a scheme for encouraging farmers to make their herds tubercle-free, and has the satisfaction of being able to boast that twenty-two herds have been freed from tuberculosis and are now supplying tubercle-free milk. This milk costs about a halfpenny a quart more than ordinary milk, which seems a small sum if the total consumption is not large; but when this question was discussed at the General Hospital a few years ago, the adoption of tubercle-free milk involved an additional expense to the hospital of no less than £300 a year!

That there is some reason for taking precautions against infected milk is shown by the examinations made in many of the great towns, which have proved that from 5 to 10 per cent. of the samples of milk examined contained tubercle bacilli. Attempts to deal with this problem have been made by what are known as the Manchester Model Clauses, which require that all dairymen sending milk into the city must notify such of their cows as have tuberculosis of the udder, and power is given to the Corporation officials to collect samples and inspect cow-houses in all dairies in the city or from which milk is sent into the city, and, lastly, to prohibit infected milk from being so sent. But the effect is said to have been only moderately successful, and there is now a demand for legislation which would make it penal to keep cows affected with tubercle of the udder for milking purposes after the lapse of a probationary period of two or three years, during which the farmers would be expected to reform their herds. In Birmingham every cowhouse within the city is submitted to a veterinary inspection once in six weeks—a system which, with the aid of the recent Tuberculosis Order enabling cows in an advanced stage of tuberculosis to be destroyed, has resulted in a considerable improvement in the quality of the milk. Samples of milk are also taken at the railway-station, and when found to contain living bacilli, the farm from which the milk came is visited, and action is taken under the Birmingham Corporation Act, 1903, with a view of getting rid of the cow giving tuberculous milk.

Preventive Measures.

Tuberculosis is not a new disease, for Professor Elliot Smith tells me that he has seen ten cases of tubercular disease of the spine in Egyptian mummies, one of which went back as far as the First Dynasty —that is, about 3500 B.C.—several others about 2000 B.C., and others about 1500 B.C.; yet in modern Egypt tuberculosis was unknown until recently, and has made its appearance in Palestine and Egypt within the memory of medical men now practising there; they attribute its introduction to infected Russian pilgrims, and to the return of native

emigrants from America. The disease is apparently spreading rapidly, as the people have no immunity, it shows itself with great virulence, so as to cause a positive panic among the population, whose habits are by no means sanitary, and who are unprovided with means for medical treatment. What were the circumstances which caused the decline and ultimate disappearance of the disease in ancient times we do not know. It is hard to attribute them altogether to altered environment, for anthropologists and archæologists tell us that the races inhabiting the Nile Valley are essentially the same, and their mode of life has practically changed very little for thousands of years. We are obliged to admit that, like other infectious diseases, tuberculosis occurs in waves, which have their rise, their period of maximum height, and that this is followed by a fall. We see this sequence in such diseases as plague, influenza, cholera, and typhoid fever, but the interval of time is short, lasting at most over a few decades ; with tuberculosis it apparently extends over centuries. There is evidence that we are now in the period of decline, as during the last half-century there has been a fall in the death-rate from pulmonary tuberculosis of at least one-half. In the latest (1912-13) annual report of Dr. Arthur Newsholme, the Medical Officer of the Local Government Board, we are told that the death-rate has fallen 25 per cent. as compared with the decennium 1891-1900, so that there is much to encourage the hope that great results may be expected from the present combined effort. Either the virulence of the infection is subsiding or the resistance of the population is increasing. Although it is impossible to attribute the improvement to sanitary efforts alone, as the fall in the death-rate preceded by a good many years the alteration in the conditions of life on which we can at present justly congratulate ourselves, it affords no argument for relaxing our defensive measures, but, on the contrary, encourages us with a hopeful prospect of success, now that the assault is weakening and the enemy is beginning to retire.

Hygienic Housing and Town Planning.

In the first line of preventive measures is the improvement of the housing of the people, a principle which has no more strenuous advocate than Dr. John Robertson, Medical Officer of Health for Birmingham. So many houses of the poor are built back to back, and consequently are ill-ventilated, devoid of sunlight, in many cases damp, without sufficient water-supply, and therefore affording little inducement to their inhabitants to keep their dwellings and persons clean. During the year 1912 closing orders were made in 1,262 Birmingham houses, and Dr. Robertson says the people are showing a laudable desire to get away to the outskirts, where better houses exist. There is a limited number of workers whose occupations require them to live near the

centre of the city, and for these provision ought to be made by municipal effort if private enterprise fails. The number of such persons is continually undergoing reduction either by the transference of factories to the outskirts or by vastly improved and cheapened means of communication. This reminds me of the saying once addressed by George Stephenson to an incredulous working-class audience, that the time would come in which the working men would find it cheaper to ride than to walk. He thought this would be brought about by the railways, but it has certainly come to be true in the present day with the network of tramways which enables all working people to get to and from their work with a minimum of expense and loss of time.

It should be the aim of each municipality to have their suburbs planned so that houses suitable for artisans' dwellings may be found within a reasonable distance, and so built that each house possesses a due amount of air and sunlight. Smethwick has not overlooked this matter, although its area is somewhat thickly populated; on the west, adjoining Warley, steps have been taken for planning 330 acres, but there is a much larger plot belonging to Oldbury and adjoining to the Smethwick area, for which the Urban District Council of Oldbury is promoting a comprehensive town planning scheme. The two together will form a very respectable space saved for future development. Those who remember what the country used to be only thirty years ago between Smethwick and the Lightwoods must regret that there was no Town Planning Act in operation to save this pretty part from the fate which has overtaken it. Your great neighbour Birmingham has made a beginning with town planning, and the energetic philanthropy of Mr. John Nettlefold anticipated the action of the city by starting the model village at Harborne. That, too, was preceded by Mr. Cadbury's successful experiment at Bournville, although, as that is, I believe, limited to the employés at the cocoa factory, it is hardly comparable with a town planning scheme which offers houses to all persons able and willing to pay the rents. Two years ago I opened an exhibition of this kind at Hull, and in the course of the speeches reference was made to a garden village which had a population of 2,000, where phthisis had remained unknown, although, according to the average, at least four cases should have developed in the time. In addition to improvements in dwellings there have been great changes for the better in factories, many of which have been recently rebuilt in healthier situations and with far greater provision for natural lighting and ventilation. It is the object of the sanitary reformer to abolish slums, but we must remember that slums are to a large extent made so by the people who live in them. The houses have not always been bad; in many cases they have been occupied at one time by a quite superior

class of tenants, and their degradation has been due as much to the people who live in them as to any inherent condition. No one wishes to see the working classes living in large barracks, but yet there is a class for whom buildings on the Rowton House plan may be the only possible means by which to provide them with decent surroundings, and in this way offer them a step towards recovering their self-respect.

Before leaving the question of houses, I must not omit to say that where they have been inhabited by tuberculous patients they may remain a source of infection to succeeding tenants. It is, therefore, most important that thorough disinfection of such houses should be undertaken by the sanitary authority, and this should be regarded as equally necessary as after scarlatina and smallpox.

Tuberculosis and Poverty.

The relationship of tuberculosis to poverty has been statistically demonstrated over and over again, but poverty is a complex condition by no means explained by a wages scale. It is determined much more by spendings than by earnings. We hear a great deal about the increased cost of living, yet most things are cheaper than they were forty years ago, while wages are considerably higher; and we hear far too little about judicious spending, the art of marketing, and the value of food. There is an insurmountable prejudice against any food that is cheap.

I do not mean to deny that there is a good deal of poverty, but there is far more bad management and wastefulness. No doubt, if there was better management in this respect, there would be an improvement in health and more money in the Savings Bank; but as a community we can do nothing to raise the rate of wages, or to enable those who earn money to spend it more wisely.

The Compulsory Notification of Tuberculous Cases.

In the direct attack on the problem of tuberculosis, one of the most powerful weapons is compulsory notification of the disease. It was probably wise to proceed gradually, by making it at first voluntary, and after it had been found that there was no serious interference with the principle of medical secrecy or the rights of patients, it was easy to make it compulsory. I believe that this has met with, on the whole, little if any opposition, and that there has been hearty co-operation on the part of medical practitioners. When the name and address of the patient has been obtained, the case is visited by the tuberculosis nurse, and she obtains all the facts of the case, which are kept for reference in the register at the office. In many cases the private practitioner is glad to hand over the treatment to the Tuberculosis Medical Officer, who makes a careful examination of the patient and also of the other

members of the family, so as to detect any early cases of the disease, is present. Many consumptive patients are able to work, and are bread-winners or housewives whose presence at home can be ill spared; so that if it is possible so to arrange that they can have many, if not all, the advantages of sanatorium regimen at home, it is obviously the best thing to do. Shelters, which cost from £4 to £10 apiece, are lent by the local authority, and even bedsteads and bedding will sometimes accompany them. These shelters can be erected wherever there is a backyard or garden, and the nurse can soon put the patient in the way of arranging the sleeping accommodation so as to be quite comfortable. This plan is, of course, only suitable for cases in a certain stage and under special conditions.

Sanatorium treatment is suitable for early cases only. Intermediate cases may be treated at home, but advanced cases may need to be removed to a special hospital. They are a serious source of danger to others, especially when they live in poor homes where they must occupy a bedroom with others, and require such nursing and attendance which would preclude them from being placed in a shelter outside. There may be, also, insufficient means to supply them with the food and nourishment they require, and the whole family may, by the presence of one inmate, be dragged down into poverty. Under such conditions it is better that the case should be removed to what is called a "hospital for advanced cases." Berlin has already 500 beds for advanced cases, and is about to double the number; Edinburgh has 198 beds, besides a farm colony; Birmingham has only 52 beds, which became available since the beginning of February. So that, judged by the local standard, Smethwick will not be far behind.

The Protection of Children.

Provision must always be made for tuberculous and tuberculously disposed children. In every large centre open-air schools should be provided, and there ought to be an effort made to deal with children crippled by tuberculosis on lines similar to that of the Birmingham Cripples' Union. This society, with the financial assistance of Mr. George Cadbury, has established at the Woodlands, Northfield, a sort of open-air sanatorium, where children may be kept for about two years. They receive education, and are discharged with their deformities corrected. A London society has adopted a less expensive plan of boarding out the children in country cottages, where they are visited by some lady resident in the neighbourhood and by the local doctor, who are generally found willing to give their services for the benefit of the little patient. No doubt any necessary operations must be carried out in hospital, and it can only be at a certain stage that the case is suitable for this kind of treatment; but it is not desirable to keep a

child in hospital for two years, nor can it do much harm for children, at the age at which these troubles usually occur, to be deprived of education for a few years.

TUBERCLE VACCINATION: THE PROTECTIVE RÔLE OF THE BOVINE BACILLUS.

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It will be admitted that with a micro-organism so ubiquitous as the tubercle bacillus, we cannot afford to ignore questions of immunization and protection at the same time as we are directing our efforts towards its elimination. The latter goal must still be far from us, and while we are pressing towards it, other issues of importance demand our serious consideration. Of these the most vital to us, living in crowded communities, is the question of acquired immunity from constant slight contact with the germs of disease, and the thesis I propose to defend in the present paper may be shortly stated as follows: That until human sources of infection can be practically eliminated, or artificial immunization becomes an accomplished fact, infection with the bovine bacillus through the use of a well-mixed milk remains our best ally in the campaign against tuberculosis.

This proposition will be best considered under four headings, followed by a short conclusion.

1. *Among Crowded Communities, Infection with the Tubercle Bacillus, whether of Human or Bovine Source, cannot be avoided.*—The high incidence of tuberculosis was first impressed upon the world by the well-known figures of Naegeli of Zurich, but it now appears that a still higher frequency of tuberculous lesions found at autopsy has come to light from still earlier studies—namely, those of Bollinger and Müller for the years 1881 to 1888. They found tuberculous lesions in the following percentage of cases:

Age.	Percentage showing Tuberculous Lesions.
0 to 1 year	12·25
1 to 2 years	28·5
2 to 3 ,, ...	36·9
4 to 5 ,, ...	61·9
6 to 10 ,, ...	40 to 50
10 to 11 ,, ...	85·0

These figures come nearer to the modern section statistics of Hamburger and Sluka (Vienna) and of Müller (Berlin); and though it is to

be remembered that this is hospital material, and hence concentrated, it yet paves the way for the startling discoveries of Hamburger and Monti among living people with the more delicate tuberculin reactions. These observers found for Vienna as many as 50 per cent. tuberculous at five years of age, 85 per cent. at ten years, and 94 per cent. at thirteen and fourteen years; and but little lower and in practical correspondence are the figures of Nothmann for Düsseldorf, Mantoux for Paris, Petruschky for Dantzig, Ganghofner for Prague. In this country the figures of Lapage for Manchester and McNeil for Edinburgh do not greatly differ from those found for Continental towns, though the Edinburgh figures present certain peculiarities to be referred to under another heading.

2. *Tuberculous Lesions, and hence Infection with the Tubercle Bacillus, protect the Individual against further Attack, whether from Without or from Within.* — That tuberculous lesions are protective we have ample evidence to show. Artificial immunization against tuberculosis is, unfortunately, not yet with us. Innumerable experiments with bacilli of low or absent virulence have all proceeded to failure, and it appears as if nothing less than a definite tuberculous lesion will afford protection against further infection. For this reason the immunization of cattle with tubercle bacilli of *Typus humanus*, as exemplified in Von Behring's "bovovaccine" or Koch and Schultz's "tauruman," is but of temporary service, the virulence of this organism for adult cattle being too low to provoke tissue-response in the form of tuberculous lesions. There remains the possibility that certain discoveries of Hans Much and Deycke may lead to protection being achieved for humans without the use of living bacilli, but this belongs to the future.

That tuberculous lesions, even when slight and harmless, yet lead to protection against further infection, there is no reason to doubt. Koch's original demonstration that a second inoculation led to local inflammation and necrosis, with elimination of dead material and bacilli, but with no permanent ulceration or glandular disease such as occur to a primary inoculation, has been amply confirmed by Arloing, Römer and Joseph, Calmette and Guérin, and others, and has been shown by Kraus to be applicable to apes, and hence may be fairly presumed for man. Indeed, clinical evidence also points clearly to the presence of such immunity amongst humans. The comparative rarity of intestinal and other tuberculous complications in phthisis may be quoted in support. The protection, moreover, afforded by infection in early life is revealed in many ways. Mayo points out that in Minnesota, where surgical tuberculosis is rife, phthisis is uncommon. Marfan declares that persons with healed tuberculosis of skin and glands never get phthisis. Turban, Weicher, King record the more favourable course of phthisis where a family history of tuberculosis is present, and

the same is the case where the individual has been "scrofulous." The ready curability of phthisis at the age of seven to ten years, remarked on by Hamburger, and well known to all physicians of experience, seems evidence of retention of early immunity to a greater degree than in adults. The same probably accounts to a notable extent for the remarkably low death-rate from tuberculosis of all forms in the later years of childhood, so clearly brought out by the Registrar-General's reports. In putting forward this argument we must not lose sight also of the effect of removal of the susceptible during the high mortality of the first few years of life.

3. *Absence of Acquired Immunity renders the Individual liable at any Age to Acute Forms of Tubercle.*—Absence of acquired immunity must affect two classes of individual—young children and the natives of tubercle-free neighbourhoods. It has been advanced as an interesting problem that young children become infected and immunized with but little disturbance of health, while adults from tubercle-free districts so readily succumb to acute forms of the disease. This is to ignore the enormous mortality from acute tubercle in infancy, the death-rate per million being considerably higher for the age-period under five years than for any other twenty-year period of later life. That most of these deaths are due to infection with the human strain of tubercle bacillus is rendered probable by post-mortem experience; for disease of bronchial glands or lung is present in nearly all such cases, while marked abdominal infection, for which the bovine bacillus is especially responsible, is present in a much smaller proportion, which varies somewhat with locality and observer.

That the absence of acquired immunity may be of serious consequence to adults as well as children is abundantly exemplified by the alarming susceptibility of individuals living in tubercle-free districts. Thus the introduction of tuberculosis into Madeira led to a high mortality among the Portuguese natives, while among the European inhabitants it was but little evident. Metchnikoff, Burnet, and Tarassevitch found that the Kalmucks of the Steppes near the Volga and Caspian Sea coming into the towns died of tuberculosis, so that the girls' school at Astrachan had to be closed, and removal of the boys' school was contemplated. Among such tubercle-free communities acute forms of tubercle, such as are only seen among children in older civilized communities, are common. Thus Westenhoeffer, investigating the conditions in Santiago, Chili, found that among 45 deaths 24 had general miliary tubercle; 28 were chronic, but caseous and with no fibrosis, and 17 showed a caseous pneumonia; 25 cases exhibited intestinal ulceration. Similar conditions as regards form of disease and high mortality-rate were found by Deycke in Turkey, Much in Palestine, Block in Lapland, Wagon in French Guiana, Bernard in

Annam, Peiper in German West Africa, Römer in the Argentine. This last observer has succinctly summed up for us the conclusions to which consideration of Sections 2 and 3 must inevitably lead us. "The less widespread in a community is tuberculosis," he remarks, "the higher is the case mortality"; and farther on comes the striking and significant corollary: "The wider spread is tuberculosis in a community, the smaller the case mortality." It is hard to disagree with these conclusions.

4. *The Bovine Bacillus can afford Protection, and is much less Virulent to Man than the Human Strain of the Tubercle Bacillus.*—That the bovine bacillus can cause tuberculosis in man will not be denied since the findings of the English Royal Commission, the German Imperial Commission, and the exhaustive work done by Weber and others at the Kaiserliche Gesundheitsamt in Berlin. That it can protect against infection with *Typus humanus* is made highly probable by the rarity of phthisis with surgical tuberculosis already referred to. Very significant in this respect also are the figures of McNeil for Edinburgh, where, as shown by Fraser and Philp Mitchell, tuberculosis of bovine origin is particularly rife. Comparing Edinburgh with Vienna, he finds the incidence of tubercle infection higher in the former for children up to the age of four years, and this in itself is highly suggestive of milk infection; but the valuable comment on this is the fact that the mortality from phthisis in Vienna is nearly three times as high as that for Edinburgh. Indeed, the high incidence of abdominal tuberculosis and the low mortality from phthisis is a characteristic of Great Britain as a whole when compared with other civilized countries of Europe, and this may well bear the interpretation that it is the early bovine infection which protects against the inroads of pulmonary tuberculosis caused by the human strain of tubercle bacillus.

That the bovine bacillus is less virulent to man than the human variety is hardly open to doubt. The lesions to which it gives rise are mainly confined to glands in the abdominal and cervical regions of children, and the disease (rare instances of miliary tuberculosis apart) remains, as a rule, localized and recoverable. Practically all the dangerous and fatal forms of tuberculosis—the lung diseases of childhood and phthisis of adults, as well as disease of bones, joints, and thoracic glands to a large extent—are due to the bacillus of human strain. Thus the virulence of the bovine bacillus may be said to be slight for children, while attempts made by Baumgarten to inoculate it into cancerous adults persistently failed. Its comparative avirulence is well exemplified in some investigations published by Weber in 1910, and similar ones by Ungermann in 1912, among infants fed from cows with tuberculous udders. But few of these children developed tuberculosis, and when they did so it was of mild and recoverable type.

This is in striking contrast to the figures of Floyd and Bowditch for children living in phthisical households, among whom a large proportion developed serious lung tuberculosis. Doubtless the different path of infection, respiratory to a large extent on the one hand, and alimentary on the other, must play an important part in the different results of infection through milk and from human sources, since it is well known that many thousand times the dose is required for alimentary as suffices for respiratory infections.

5. *General Conclusions.*—The evidence collected in the foregoing paragraphs must go far to convince us of the following points: (1) That infection with the tubercle bacillus cannot be avoided in civilized communities; (2) that such infection protects against further tuberculous invasion; (3) that its absence is a danger to the individual; and, furthermore, (4) that alimentary infection with the bovine bacillus will suffice for such immunity, and is comparatively safe contrasted with the great danger of the bacillus derived from human sources. It only remains to draw the inevitable conclusions to which these facts lead. Since infection is practically unavoidable, it is only left to us to decide whether we will voluntarily present to our children the comparatively innocuous bovine bacillus, or leave them to risk a first encounter with the infinitely more dangerous bacillus of human strain. Surely, when the issues are fully seen, even the flabbiest public opinion will accept the former as the only reasonable solution to a difficult problem. How it is to be done is a matter of some moment, for the feeding of a definite number of millions of living bovine bacilli to an infant would painfully shock the feelings of persons who would tolerate equal or more dangerous doses given in the guise of raw cow's milk. The safest and most practical method open to us at the present time seems to me to lie in the use of a well-mixed milk such as the large London dairy companies supply. In such a milk the bacilli will be well diluted, and the danger of massive dosage reduced to a negligible figure. It must not be forgotten, however, that dosage is relative, and the resistance to tubercle is at a minimum during the first few months of life. It would seem best, therefore, to sterilize the milk at first, and gradually add to it increasing quantities of raw milk till this alone is given. Where, as in country districts, exposure to danger from human sources can be avoided, the administration of raw milk might be postponed to a later age with advantage. Complete extermination of bovine tuberculosis is not to be wished for so long as the human tubercle bacillus is rife among us, and fortunately it is but little likely of accomplishment. Our goal should be a clean milk-supply and adequate inspection of small byres and single cows; through these measures danger of massive bovine infection may be eliminated, and the use of raw milk be more safely and confidently recommended.

SCROFULOSIS AND TUBERCULOSIS.

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A CLEAR understanding of the true position of scrofula as a clinical entity will be considerably advanced by the recent publication in English dress of Cornet's special work on the subject.[1] According to him, the tubercle bacillus cannot possibly explain all the manifestations of scrofula; other bacteria are associated with it, or exist independently of it, especially pyogenic organisms. We must recognize two forms of scrofulosis—(1) the tuberculous, and (2) the pyogenic forms. In some instances the tubercle bacillus appears to be quite secondary, grafting itself on a pre-existing lesion of another kind. This classification will enable us to include under scrofula diseases which were formerly considered to belong to it, and yet were threatened with exclusion. To the tubercle bacillary group belong enlarged cervical and other glands, lupus and fungous joints, the diagnosis being confirmed by V. Pirquet's cutaneous reaction; while impetiginous eruptions, ozæna, etc., are dependent on pyogenic organisms, the different manifestations being determined by the soil on which the organism falls.

Characteristics and Forms of Scrofula.

There exists a symptom-complex distinctive of scrofula. Scrofulous children will show a swelling of glands, special irritation of mucous membranes, and eczematous irritation of the skin. They come under two classes: (1) the torpid form, in which the child looks pale, is unduly fat, and has a puffy face, with swollen lips and nose; and (2) the erethistic form—the opposite type—in which the child's features are thin, and the skin remarkably white and delicate, easily reddening on irritation of the superficial bloodvessels. Such children show a lessened resistance to a disease like tuberculosis, and will throw off the disease much less readily than healthy children. Probably tubercle bacilli gain an entrance through the air-passages, and the bronchial glands are affected first of all. Scrofulous children readily become tuberculous, and the affected tissues exhibit tubercle bacilli.

The Pathology of Scrofulosis.

Cornet looks upon scrofulosis as a complex of symptoms, almost entirely confined to childhood and youth, embracing not only swollen

[1] "Scrofulosis," by Professor Dr. G. Cornet. Translated from the second German edition by J. E. Bullock, M.D. London: John Bale, Sons and Danielsson, Ltd., 83-91, Great Titchfield Street, W. 1913. Price 15s.

neck glands, but certain affections of skin and mucous membranes and joints, which are characterized by persistency, recurrence, and multiplicity, and which may be traced to exogenous causes, such as either tubercle bacilli or pyogenic organisms, and a mixed form, the effects of which differ according as the tubercle bacillus or other germs come into play first or simultaneously; or to endogenous causes. According to Cornet, scrofulosis is either a slowly progressing localized tuberculosis, or an independent disease due to a certain disposition or dyscrasia which often presents tuberculous complications; it is thus evident that opinions as to the nature of scrofulosis have changed in recent times. Whereas formerly it was considered entirely distinct from tuberculosis, it may now be considered either a special disease or a tuberculous symptom-complex occurring especially in childhood. As pure tuberculosis and suppurative processes occur at all ages, and scrofulosis, almost without exception, occurs in the years of growth, there must be some primary favouring endogenous condition existing in the patient, either in the whole body or in certain parts of it, peculiar to youth, which in later years disappears of itself. Seeing that scrofulosis is met with in various organs of the body, a certain support is given to the idea that some constitutional change is connected with the predisposition to tuberculosis. Virchow described the condition as an inflammatory diathesis, and considered the pathological constitution which leads to scrofulosis to be a weakness of certain parts or regions, such as an incompleteness in the structure of the glands, generally connected with an incompleteness in the skin and mucous membranes; and as the growing glands in children are especially affected, scrofulosis is a disease of childhood. Lately the term "exudative diathesis" has been used by Czerny instead of "inflammatory diathesis." Outwardly the exudative diathesis shows itself by a mapped tongue, seborrhœa, milk-scurvy, etc., and, according to Czerny, is connected with improper nourishment and overfeeding, and depends on an innate and clinically latent defect in the composition of the body. It is due to exogenous causes, and becomes manifest early, even in the first weeks or months, by abnormal results of nourishment, such as loss of weight, though a plentiful supply of milk is taken and there is no digestive disturbance, or else by a marked increase of body fat, even when the food is poor in milk. The predisposition of infants to the exudative diathesis is connected with an innately low condition in the assimilation of milk (both human and cows' milk). Food in which the fat is replaced by carbohydrates frequently produces the phenomena of exudative diathesis and a return of the scrofulous habitus, and may be produced in children with a tendency to it by a fat-containing diet. Czerny even goes so far as to state that by means of food containing little fat the scrofulosis disappears, and scrofulous children are trans-

formed into "fine children with tuberculosis," an opinion which cannot be shared by many. Cornet draws attention to the fact that, as something more than the deprivation of milk, eggs, and sugar is necessary, we should expect an increase of scrofulosis in the later periods of infant life when milk and eggs, butter, and all fatty foods enter largely into the dietary. The fact that scrofulous symptoms may be removed by tuberculin treatment, without change of food, dispels the idea of an exudative diathesis; while the close relationship which has been traced between infection by bovine tubercle bacilli and scrofulosis confirms the supposition that scrofulous infection may be put down to tuberculous milk, and then becomes a tuberculous form of scrofulosis. Cornet remarks that it is well known that scrofulosis appears as a rule towards the end of the first and second years, and connects the experience that bovine infection appears almost without exception after the first year, with the practice, even amongst the poorer classes, of generally heating the milk for children under one year; whilst in later years, besides the frequent consumption of milk in the raw state, butter and other milk products increase the opportunities for tuberculous infection. Contrary to the idea that used to be held, that those who suffered from scrofulosis died later from tuberculosis of the lungs, it is now held by many that those who are predisposed to scrofulosis possess a certain amount of protection against tuberculosis. According to Escherich, the scrofulosis resulting from tuberculo-toxic changes in the integuments is the most harmless form of infantile tuberculosis, and offers a sort of protection against tuberculous infection. Cornet would also refer all tuberculo-scrofulous affections of the glands to bovine infection, and remarks that if scrofulosis sometimes depends on pyogenic infection, and so has nothing to do with tuberculosis, and if the tuberculous form depends on bovine infection, we are entitled to dread less tuberculosis in children, as the bovine type is, without exception, less pathological for the child than the human type. Though he admits that bovine infection may cause, in many cases in very young children, a general miliary tuberculosis, which cannot be distinguished from virulent infection of the human type, in persons of the same age, he points out that it is much more frequent for the bovine infection to act at the point of entry.

The idea connecting scrofulosis with lymphatism, a constitutional anomaly which distinguishes itself by a "great tendency of the organism to inflammatory reaction of an obstinate and recurrent nature," with exudation of lymph in which the lymphatic tissues take a decided primary and secondary part, is debated by Cornet on the ground that by drawing attention to the lymphatic system only, merely a part of the tendency is denoted, whereas it must be recognized that a certain abnormal preliminary state of the skin and mucous membranes exists in

a prominent degree, let the cause be what it may. Cornet thinks that scrofulosis is lymphatism combined with tuberculosis, the lymphatic constitution being the ground in which an accidental tuberculous infection will develop scrofulosis, and notices that Moro attaches much importance to the tuberculin reaction in discovering non-scrofulous cases, so that if they do not react positively to the tuberculin test, he considers them not scrofulous, but lymphatic, although they have all the external symptoms of scrofulosis; yet when the reaction is positive, the result perhaps of some latent focus, he considers them scrofulous. Cornet does not accept Soltmann's view—namely, that scrofulosis is an hereditary non-bacillary toxic scrofulosis—on the ground that scrofulosis does not appear immediately after birth, but generally at least six months after birth, and tuberculin reaction rarely occurs in the first year, when the toxin may be expected to be non-operative, and also though truly scrofulous children often descend from tuberculous mothers, relatively seldom from mothers who are tuberculous at the time of the child's birth. He merely mentions Behring's hypothesis, that scrofulosis is the clinical expression of the tuberculous diathesis induced by a special method of infection or by a very long latent stage.

In considering the localized diathesis residing in the skin, mucous membranes, and lymphatic glands, Cornet discusses the permeability of the skin and mucous membranes, its variation according to age and sex, holding that there is greater permeability in the young and the female sex; and in this supposed fact he finds a satisfactory explanation of the predominance of scrofulosis in youth as a special diathesis or readiness for illness in the skin, the mucous membranes and the lymph passages, by an increase of the normal greater permeability of these tissues in the young — a condition which he calls "embryonalism," and which, being more marked in girls than in boys, accounts for the greater prevalence of scrofulosis in girls (excepting scrofulosis of bones and joints).

The Managemont of the Scrofulous.

In the treatment of scrofulosis, Cornet points out the importance of recognizing the localized diathesis (embryonalism), which necessitates measures for raising the individual to "an older stage" of development, at the same time the infective germs of tubercle bacilli or pyogenous bacteria must be kept away from the body, and the spread of infection which may exist in the body must be hindered, and the consequences of the infection localized and healed. We have to consider the nature and the degree of the disease, whether there is merely a scrofulous predisposition or a pronounced scrofulo-tuberculous condition, and whether the scrofulous disposition is of the torpid or erethistic type, together with the state of nutrition and strength of the patient. Thus

it is that prophylaxis plays a great part in the treatment, and special attention must be given to general hygiene. As a matter of interest (such institutions being common in Germany, and rather lately being established in England), we notice the importance given to forest recreation places and forest schools. Cornet demands that in all districts sufficient arrangements should be made to allow of there being placed during the day in a healthy environment all those children who, in consequence of bad conditions of dwellings and of poverty, are exposed in a considerable degree to the dangers of arrested development, or of falling victims to tuberculosis or scrofulosis, and he describes the formation of forest recreation places and forest schools in Germany. He dissents from the objections which might be raised—namely, that carelessness and idleness may thereby be encouraged amongst mothers, because necessities of life compel the mothers to go out to work and leave their children much to themselves. He considers it an advantage to the State to reduce the mortality amongst weakly children, and to strengthen them, otherwise the weakly ones will grow up weakly. He remarks that infants' diseases often snatch away the strong and leave the weakly ones behind. He does not claim that forest recreation places and forest schools will remove established disease; their object is to prevent the establishment of disease. In Germany, measles, scarlet fever, etc., which often determine the development of scrofulosis and tuberculosis, have decreased during school-years when children are removed from their homes. Cornet also encourages the provision of simple dinners for children who come to school imperfectly fed, together with physical exercises, especially in the afternoon, leaving the morning to lessons, airing, and resting.

THE TREATMENT OF PULMONARY TUBERCULOSIS BY ARTIFICIAL PNEUMOTHORAX.

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The operation for the induction of artificial pneumothorax is now recognized to be one of the truest and most valuable remedies in the treatment of pulmonary tuberculosis. Professor Saugman, speaking as an authority on the subject at the last International Congress of Medicine, drew a large audience to hear his address. He made his two points plain: (1) that the operation was of most value in unilateral disease, and (2) that it was in some conditions a dangerous procedure. He has lost two patients, the deaths occurring during the operation. Such deaths are said to be due either to gas embolism or to pleuro-cardiac reflex. To guard against gas embolism, care must be taken not to introduce nitrogen until it is certain that the introducer-needle is in the pleural cavity, and not in the lung or projecting into the bordering sides of the space. If the needle pricks the lung surface, this may, of course, result in gas being driven under considerable pressure into a bloodvessel—hence embolism. The manometer indicates safety by its oscillations, which correspond to movements of the diaphragm; these oscillations are present when the needle is in the pleural cavity, and absent when it is in the lung or other tissues. There is less likelihood of gas embolism if oxygen is used instead of nitrogen for the first induction.

Pleuro-cardiac reflex is avoided by the use of a local anæsthetic and a general hypnotic. I have used many of these. In some of my cases, morphia, instead of preventing shock, has made the patient quite sick and ill. Trional and veronal seem to me to add to the cyanosis of the patient, and I am not at all certain that they lessen the shock. Chloral, bromide, and cannabis indica form my favourite hypnotic. I always use quinine-urea the night before, and again directly before the operation.

The question of the use of a local anæsthetic has excited comment of late. Dr. Vere Pearson is inclined to do without a local anæsthetic after the first induction; and he has some followers. He thinks the induction is embarrassed by the presence of the fluid injected into the tissues. Others have thought that the anæsthetic effect is in itself a danger; the local tissues are made more tolerant to nitrogen from the very absence of shock. The patient may be perfectly comfortable,

and yet the cumulative effect of the nitrogen may come perilously near to causing asphyxiation while the doctor is still unaware of anything being wrong. This is an argument against the use of veronal, trional, and morphia, in any but small doses. In Leeds we have done very many operations (we have passed the first thousand), and we would not be without local anæsthesia.

In many instances the chest becomes almost immobile, and when the pleural cavity is expanded by gas, the oscillations in the manometer, which coincide with the movements of the diaphragm, are lessened, and the excursion becomes limited.

One of the immediate symptoms following artificial pneumothorax is vertigo. I have known a man reel and fall from this cause. It may even produce this effect several hours afterwards. The greatest shock has seemed to me to take place where there has been least pulmonary disease. The operation is sometimes followed by loss of appetite for a few days; the patient loses weight at first, but afterwards he gains. In many cases it has been noticed that laryngeal hoarseness increases for a few days after the induction, and then improves. I am now attending a patient of Dr. Eustace Carter of Leeds; the case is a very serious one, and the marked downward progress, which had been going on long before treatment began, continued until six inductions had been made. Then the patient began to improve slowly in appetite, in weight, and in temperature; and, above all, the laryngeal signs and symptoms, which had been considerable, began to lessen. In hospital I have now a case which forms an exact parallel with this; here, too, the laryngeal symptoms are rapidly improving. Such cases have occurred so often that they are worthy of note; the result is most encouraging.

It has been said by some observers that disease in the working lung may be excited by interference with the function of the compressed lung; I have not seen this. It is marvellously rare to get the signs of natural pathological (as opposed to artificial) pneumothorax. Where I have met with them there have been large cavities, or, if the cavities have been small, there have been no adhesions. Such signs as the coin sound, the reverberatory tinkle, I have only found two or three times. If the pneumothorax is induced on the left side, the heart is pushed towards the right. If the pneumothorax is done on the right, the heart may be dragged towards the right, though the opposite may occur, and the impulse may be felt in the left axilla.

Here is good advice: Never introduce the gas rapidly; stop the introduction several times during the operation. The after-effects are very much more marked when the gas is rushed in, and I am sure that the danger to the patient is increased. There is an idiosyncrasy to this operation. In one case, where the disease was quite limited and localized, the patient went absolutely grey; it was significant that

the operation was causing intense pain in the chest, a pain apparently not unlike that of angina.

My methods have been criticized by various writers, notably by Drs. Carleton and Evans of the Alexandra Hospital, Davos; they have been defended by Dr. Morrison Davis. Most of the discussion in England has appeared in the pages of the *British Medical Journal*. Fehlisen and Rothschild are not deterred from operating even where the adhesions are so extensive that no pleural cavity can be found. They inject a few c.c. of gas at a time, contending that "such small quantities, if injected slowly, will not cause death, even if injected into a vein. . . . If the patient shows difficulty in breathing, if the pulse becomes frequent, irregular, or weak, then the operation is immediately stopped." Holmgren injects in such cases (with pleural adhesions) 50 to 100 c.c. of normal salt solution into the adhesions themselves; into the space thus made he afterwards injects gas.

With straightforward cases I am in favour of injecting often—that is, every week—even if only 500 c.c. or less are introduced. At both the Leeds hospitals we have, in selected cases of advanced disease, injected paraffin into the pleural cavity; this was not done until we had consulted with Dr. Saugman on the advisability of the attempt. We have also tried the injection of serum into the pleural cavity. But many such operations will have to be done before we can guide the profession as to their value. Tincture of iodine, if injected into the pleural cavity, causes very unpleasant symptoms, even when used in very dilute solution—*e.g.*, tinct. iod. ℥v. to paraffin ℥i. I have determined never to try this again until the matter has been tested by experiments on animals.

In several instances I have allowed the gas to be absorbed and the lung to expand partially, and then I have treated the opposite lung. Caution has to be observed in this matter, for the lung never, as far as I can see, expands fully again. The underlying idea of the treatment is compression of the lung; you compress the cavity in the lung, and round the cavity you permit fibroid changes sufficient to prevent re-expansion. The result of the partial obliteration of the cavity is that the sputum is lessened (in one case from ℥x. to ℥i.), that sweats are checked, and that exudation of serum into the pleural cavity may occur, and may continue for many weeks. This exudation does not necessarily take place during the first operation, nor even during the first few; it may not be until some months, even, after the treatment has begun. The hope is that the healthy lung will fully re-expand after the treatment has stopped. Of course, this is a state of things which, to quote More's concluding words in the "Utopia," "I rather wish, than hope."

INDUCED PNEUMOTHORAX IN PULMONARY TUBERCULOSIS.

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"I SHALL wait, not without hope, till I know whether the profession will deem my suggestions worthy of their countenance and support. The lamentable ravages annually made by this disease [tuberculosis] among the flower of the human race will be an apology, I trust, for any proposition, however ineffectual it may prove, that may be made with a view to its cure." Thus Dr. James Carson[1] ends the preface to his work in which he recommends the operation of artificial pneumothorax in pulmonary tuberculosis. He had performed the operation a number of times in animals with good results, and quoted instances of accidents and wounds in battle in man, and in 1821 he recommended it to the medical profession. Some years later he had two patients operated on by this method, both moribund cases, with pleural adhesions and much disorganization of the lung; one survived a month, the other only a few days. Dr. Carson's views, like those of his successor, Dr. Bodington, raised more interest on the Continent than in England; and Ramadge in 1834, Constatt in 1843, Parolo in 1849, Echler in 1867, and Forlanini in 1882, all referred to Carson's recommendation. Subsequently Dr. John B. Murphy of Chicago independently rediscovered this method of treatment, and, after publishing some successful results in 1898, found that Forlanini of Italy had used the same treatment, on the inspiration of Carson's teaching, in 1892. To-day artificial pneumothorax is used extensively on the Continent and in America, and by an increasing number of pulmonary specialists in Great Britain.

The recognized surgical treatment for inflamed tissues is rest, with in addition hyperæmia, as in Bier's treatment. In tuberculous lesions of bones and joints where the disease cannot be eradicated, and especially where there is mixed infection, the maintenance of rest and the production of hyperæmia form the principal methods of treatment used to-day, and are the main objects aimed at by the establishment of pneumothorax.

Czernicke[2] drew attention to the fact that "in some phthisical patients the supervention of pneumothorax, with subsequent spontaneous effusion, actually leads to an improvement in the general symptoms

[1] See Carson's Works, London, 1833.
[2] Czernicke, *Gazette Hebdom.*, Paris, 1872.

and physical signs, which can only be ascribed to collapse of the affected lung," but in over 75 per cent. of the cases death occurs rapidly owing to shock or fatal infection. Hughes[1] had previously noted that in cases of diseased lung pneumothorax frequently produced no symptoms, and there is little doubt that the difference in result between these two extremes is due primarily to the relative condition of the two lungs and the extent and rapidity of the compression produced, but mainly to the spread of infection through the pleural cavity and the system by the breaking down of purulent lung tissue, as shown by a comparison of the records of the cases. My attention was first drawn to this subject by the occurrence, under my treatment, of a case of the first type.

Sanatorium treatment consists in placing the patient at rest until signs of auto-inoculation are reduced, and gradually increasing movements controlling same by the amount of auto-inoculation; but when a patient is removed from his accustomed home comforts and warm rooms to the cold air and exposure of sanatorium life, a greater strain is thrown on his organs of respiration, as to supply the necessary heat evolved by combustion deeper inspiration of air is necessary, and over a series of measurements of 200 cases I found that, in the first month of residence, the chest measurements on normal breathing had increased on inspiration from 1 to 1½ inches, and on expiration almost a similar amount, allowing for any increase of adiposity in the meantime, showing that increased work was being done by the lungs. A large percentage of cases improve under the treatment owing to the hygenic conditions, etc.; but some fail to recover, and it is in these cases that operative treatment is essential.

One of the first signs of tuberculous disease involving the lungs is diminished movement of the chest, the upper ribs or diaphragm of the affected side lagging, as compared with the sound side. Thus Nature attempts to provide rest for the diseased part, in the same manner as the pain and swelling in a diseased joint tend to prevent movement, and the same surgical treatment is indicated—viz., absolute rest. Induced pneumothorax is the simplest method of supplying this.

As shown by Moore,[2] the site of election of the lesions of the tubercle bacillus is in tissues with a poor blood-supply, and the tendency of the pathological lesion is to further restrict this supply by the growth of connective tissue, and I have proved[3] that the growth of the bacillus is inhibited in an atmosphere enriched in oxygen. It is a common fallacy that the lungs are well supplied with blood owing to the pulmonary circulation, but the blood passing through the lungs by this

[1] Hughes, *Medical Gazette*, London, 1844.
[2] Moore: *Brit. Med. Journ.*, July 20, 1912.
[3] Adams: *Bio-Chemical Journal*, vol. vi., pt. 10, 1910.

route is venous in character, and not nutrient to the tissues; the nutrient blood-supply to the lungs is through the bronchial arteries, one to three in number, which spring from the aorta or intercostal arteries; therefore by the cutting off of the pulmonary circulation, and compression of the lung, the supply to the tissues is not only undiminished, but relatively increased, as the area is much reduced.

Various methods of compression are recommended. Estlander recommends a thoracoplasty, by removal of a portion of the ribs and allowing the chest wall to fall in; but this is a radical operation, and does not make any provision for future expansion and use of the lung. By introducing gases or liquids into the pleural cavity the same result can be obtained in suitable cases, and the lung compressed, and afterwards allowed to expand when necessary. It is found that nitrogen gas gives the best results, being inert, non-toxic, and non-irritating, and the most slowly absorbed of the gases. Air may also be used, but the oxygen is rapidly absorbed by the pleura, and the operation must be sooner repeated. By the introduction of the gas, as first pointed out by Carson, the diseased part is immobilized, the cavities compressed, and contents evacuated through the bronchi and their wall brought into opposition, whereby the obliteration of the vomica and its replacement by connective tissue is hastened, auto-inoculation is diminished, the symptoms of the disease are at once ameliorated and the reparative powers of the lung assisted.

Brauer recommends an open operation under local anæsthetic, to expose the pleura, and then search with a ureteral catheter passed through a canula for adhesions, before inflation; but this method is complicated, liable to sepsis, and causes severe pain, and cannot be repeated. The method I have adopted is based on Murphy's and Forlanini's teaching. The patient lies on his side in bed, with the affected side uppermost, and the arm brought well forward and reaching up as if to grasp the bedpost. In this position the patient lies in comfort, and the scapula is brought well clear of the point of puncture. Iodine (2 per cent. in S.V.R.) is painted freely over the skin for an area of 6 to 8 square inches round the scapular line, and 0·025 grm. quinine urea in solution injected intradermically internal to the proposed point of puncture, but along the course of the nerves supplying it, through a 2-inch Schimmel needle. A sharp platinum-iridium needle of the same pattern and little larger than an ordinary hypodermic needle, with an obturator which accurately fits its interior, so that when pushed down its lumen is completely cleared, is now passed carefully through skin and tissues, and between sixth and seventh or seventh and eighth ribs, until the pleura is reached and penetrated. A distinct resistance is noticed at this point, and the patient complains of momentary pain. The needle is now cleared by pushing home the obturator, and on withdrawing this, and

affixing the rubber tubing attached to the manometer to the needle an oscillation of negative pressures of from 3 to 10 cm. of water is shown, according to the depth of inspiration, if the point of needle is in the pleural cavity. Nitrogen may now safely be allowed to pass through the tube, drawn by the negative pressure, the rate of flow being regulated by stopcock; and as the negative pressure diminishes a small positive pressure is applied to the gas, the pressure in the tube being constantly recorded by the manometer. Usually the patient does not experience any sensation until the manometer shows that the point of neutral pressure is being reached, when, on the first operation, he complains of an increasing fulness in the chest, and there is a small amount of dyspnœa and distress; this is the important guide to the amount of gas to be introduced. In some patients I have found 300 c.c. produce more distress than 1,000 c.c. in others, and it is not pushed to any great extent relying on producing an increasing amount of compression in subsequent refillings. An accurate reading of the manometer is now made, with the gas-supply cut off and this is noted for future reference. On succeeding occasions a higher end-pressure of 6 to 8 cm. of water is aimed at; the lung is gradually more compressed as the opposite lung responds to the demands made, and dyspnœa and other symptoms thus avoided. The needle is now withdrawn and the puncture sealed with collodion, the whole operation, provided the pleural cavity is quickly found, being completed in about ten minutes, without more pain and distress than caused by a hypodermic injection, and refills may easily be done on a couch in the surgery. Should the manometer fail to record the respiratory movements satisfactorily, one of the following causes must be looked for: (1) The needle may be blocked by blood or a portion of the tissues; this rarely happens with the needle recommended, as the small aperture does not cut out a portion of skin, and the obturator effectually clears out any soft tissues or blood which may happen to find its way into the point, but it may be again passed down the needle to insure that it is patent. (2) The parietal pleura may not have been penetrated. In adipose subjects the needle frequently has to be pushed home almost to its full extent; usually, however, about half the length of the needle only has to be inserted, and it may be gently pushed a little farther and again tested with the manometer. (3) The lung may lie like a valve against the point of the needle, owing to the shape of the needle used; this can only occur in the presence of adhesions, which, unfortunately, cannot be accurately diagnosed by physical signs, and it only remains to repuncture at another site. (4) The needle may have penetrated both layers of the pleura. In this case air and frothy blood usually obstruct the lumen, and are seen when connecting up to the manometer, where a small negative pressure may register; the needle

is also seen to move with respiration, and the patient usually expectorates some blood. Complete withdrawal of the needle and rinsing in sterile saline to free it from clot is necessary, and a repuncture may then be made near the former site, taking care not to insert the point beyond the parietal pleura. The trauma caused in the lung is insignificant, and does not cause any further trouble whether inflation takes place or not; and there is no record of any serious complication from this cause, although a possibility exists of infection from a septic focus in the lung. If the manometric fluctuations are small, and any doubt exists as to whether the needle is actually in the pleural cavity, oxygen should first be allowed to pass in from a separate container; 100 c.c. to 200 c.c. may be safely used in this way, and there is no danger of air embolus being caused, as the oxygen is rapidly dissolved in the blood or body fluids, and if in the proper cavity the pressure quickly falls to normal, the nitrogen may be allowed to pass in safely. Physical examination and X rays show, after the operation, all the signs of pneumothorax and compressed lung, the extent varying with the amount of gas used. The lung remains collapsed for three to four weeks, breath sounds reappearing gradually from about the second to third week, and therefore it is necessary to renew the gas in about one to two weeks at first, the intervals gradually extending, as the gas is absolved more slowly after a time. It is advisable on the first occasion to keep the patient in bed for twenty-four hours, but on subsequent occasions this is unnecessary. Some operators give a dose of morphia before commencing the operation, but I have now discarded this practice as the pain is so infinitesimal, and it tends to mask the sensation of pressure in the chest, which is a useful guide to the amount of gas to be administered.

The complications which may arise through the operation are pain, shock, hæmorrhage, sepsis, air embolus, and surgical emphysema. Pain during the operation, if reasonable care is exercised, is absent, but occasionally follows the first or second inflation, and is usually due to the breaking down of adhesions, or, as a consequence of an excessive end-pressure being reached, the diaphragm is displaced downwards; but the effect is only transient, and I have never observed it sufficient to keep the patient awake; occasionally, however, operators have found it necessary to withdraw a portion of the gas, and this is more likely to occur where morphia has been administered before operation and masks the symptoms. The irritation of the parietal pleura due to the puncture by the needle is said sometimes to cause a severe reflex, but with a small sharp needle as used the danger of any severe result is remote.

The risk of hæmorrhage from an intercostal vein, or from the lung through the minute wound caused, may also be safely ignored, and thorough sterilizing of the needle may be secured by passing it through

a flame or keeping it in a 5 per cent. solution of lysol in absolute alcohol, when it should be rinsed in sterile saline just before use. Iodine applied to the skin externally is a safe and efficient sterilizing agent, and prevents any sepsis from this source.

If the precaution of never allowing the nitrogen gas to flow in, unless the manometer gives certain indication that it registers the intrapleural pressure, be adopted, and in case of doubt only allowing oxygen to pass, the risk of air embolism or surgical emphysema is avoided; no untoward result can arise from the injection of pure oxygen into the tissues or vessels at the pressure recommended.

The most satisfactory results are obtained with the earliest cases, and, as in bone tuberculosis, operation should be performed as soon as possible; but under sanatorium treatment the majority of early cases of pulmonary tuberculosis show such marked improvement that operative measures are uncalled for, and it is only in those cases which failed to respond to that treatment after a trial of two to four months that I have advised interference, and then only when the other lung was in a satisfactory condition. Monolobar or unilateral types of the disease, where the symptoms show fairly acute mischief, with pyrexia, cough, expectoration, and signs of marked systemic disturbance, have so far best repaid the trouble.

Cases of pleuritic adhesions of recent formation are suitable—the pressure exerted tends to stretch and break these down gradually; but in old-standing adhesions with diseased lung there is a risk of tearing the lung and spreading sepsis, and collapse is very difficult to ensure.

Hæmoptysis may be readily checked by collapse of the lung, and in cases of cavities the purulent contents are quickly expelled and prevented from re-forming. Chronic non-tuberculous diseases of the lung are also indicated as suitable, but it is questionable if the collapse of the lung in advanced fibrous cases is beneficial.

After induced pneumothorax, the sputum for a day or so shows an increase, and then rapidly diminishes, at the same time changing periodically from purulent to mucoid, and the tubercle bacilli disappear, cough becomes less troublesome and gradually ceases. Signs of toxæmia are lessened, the appetite returns, and the patient soon begins to increase in weight and show marked improvement.

It has been fully proved that collapse of the lung may exist for years and yet recover its function, and the principle adopted is to first cure the disease and then restore function; as a result of experience, in the majority of cases the disease is fully arrested by six to twelve months' compression and rest, during the major portion of which time the patient may resume his ordinary work without discomfort.

The number of "unimproved" or "slightly improved" discharges from sanatoria can be materially reduced by pneumothorax. The

operation is comparatively easy to perform, and accompanying risks are small. It does not require an indefinite sojourn in a sanatorium after compression is fully achieved.

THE ORGANIZATION AND ADMINISTRATION OF TUBERCULOSIS WORK IN RURAL DISTRICTS.

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M.D., C.M.,

Tuberculosis Officer for the West Riding of Yorkshire; Late Medical Officer to the Consumptive Sanatoria of Scotland, Bridge of Weir.

The problem of planting tuberculosis centres throughout a rural area, so as to offer reasonable facilities to the patients without the creation of an inordinate staff and extravagant multiplicity of premises, is no easy one; and in the initial stages it seems wise to proceed with caution if the imposition of an intolerable burden is to be avoided. The suggestion of the Astor Committee that a centre should be established for each 150,000 of the population promises to work well under average circumstances, but when an area is very sparsely populated, only 100,000 may be effectively dealt with by a Tuberculosis Officer. A short note regarding the approved scheme for a large and important rural district may be of interest and service at the present moment. Under the scheme of the County Medical Officer, the West Riding Administrative County has been divided into ten areas, each being under the charge of a District Tuberculosis Officer. Taking an area with a population of about 150,000, three centres have been selected as the natural geographical points to which the inhabitants have convenient access, and in these the most suitable premises available have been secured to serve the purposes of a tuberculosis dispensary. In the heart of the area the central dispensary of the three is housed in larger premises, with accommodation where possible for three or four observation beds, and for two nurses in addition to caretakers. The number of dispensaries which can be carried on by one Tuberculosis Officer naturally depends upon the treatment employed; and if tuberculin be administered twice weekly, it will be found that the energies of the officer will be sufficiently taxed by attendance at three dispensaries, with an additional visiting-station in the areas with an unusually large acreage. On two evenings weekly attendance is given to suit the convenience of patients who are able to follow their employment, and in some cases it proves suitable to offer treatment on one evening at each of two centres; for

when patients are able to resume work the point has usually been reached when a weekly injection of tuberculin is appropriate. Any extension of facilities for treatment in an area would necessitate an addition to the staff, with the attendant increase of expenditure. One day is usually kept free from dispensary attendance for visiting patients in their homes, and another half-day is similarly set apart; so that when these duties—in addition to the clerical work entailed by the keeping of records, making reports, and corresponding with medical practitioners—are fulfilled, the time of the Tuberculosis Officer is fully occupied. The routine followed in securing treatment is—(1) Application is made to the clerk of the District Insurance Committee, or to the Tuberculosis Officer at the dispensary; (2) the District Tuberculosis Officer on receiving the application form filled up makes a recommendation to the Committee on a form suitable for submission to laymen, and at the same time forwards a concise medical report to the central office; (3) if this is approved, arrangements are made for admission to the appropriate residential institution, the central office acting as the clearing-house, having the returns from the various sanatoria and hospitals filed. At present four sanatoria within the West Riding reserve their accommodation for patients from this area, and occasionally other institutions are drawn upon pending the erection of a large sanatorium.

In an extensive rural area it will be necessary to have hospital beds available in various centres, so that cases calling for isolation may conveniently be removed and visited by relatives without undue difficulty. While areas have been mapped out as convenient units for administration under a District Tuberculosis Officer, the convenience of patients must be the main consideration; and the branch dispensary which can be attended with the least expenditure of energy and money will eventually decide the boundaries of those units after experience has been gained. The isolated cases which may occur in remote parts can hardly have dispensary treatment brought within reach, and in such circumstances arrangements require to be made for any special treatment to be carried out by the medical attendant with occasional consultations on the part of the District Tuberculosis Officer. It is of importance in rural areas to select the local market-day for opening the dispensaries, so that patients from surrounding districts may easily obtain conveyances; and this is also of advantage in securing the attendance of contacts for examination. While it is obviously impossible to offer domiciliary treatment by the District Tuberculosis Officer, occasional visits in consultation with the medical attendant are paid, and the visits paid by the tuberculosis nurses keep the officer in touch with patients who have been advised to rest in bed at home. An endeavour is made by the County Medical Officer to link up the local Medical Officers of Health with the tuberculosis administration in each

area in relation to housing conditions, disinfection of dwellings, searching out of contacts, and selection of sites for open-air shelters; and co-ordination of the various nursing services is being considered, which will prove of value in rural areas particularly.

The provision of open-air shelters is of considerable utility in districts such as those under consideration where a suitable site can frequently be obtained; and suitable structures are being supplied to patients in the West Riding to the number of one hundred. Administration in an extensive rural area must be centralized, and the work co-ordinated from a central office. This necessitates considerable clerical work, and entails the keeping of a register containing particulars of all applications, the course adopted in dealing with them, and the dates of admission and discharge when treatment in a residential institution is granted. A card index system for the use of the clerical staff, with the names arranged alphabetically under the various districts into which an area is subdivided, proves useful; and for use by the Tuberculosis Officer, a card index system, with medical details for report purposes, is conveniently arranged under guide cards bearing the names of the institutions to which patients have been admitted, while the cards of patients who have not been treated in an institution are arranged apart alphabetically. Weekly returns forwarded from the dispensaries call for the keeping of attendance registers at the central office, and a register of shelters provided with the names of the occupants is another necessary addition to the clerical burden.

It may be remarked that all forms of tuberculosis are receiving treatment at the West Riding dispensaries, and that sanatorium treatment is open to all classes of the community, insured, dependants, and others. The organization has been rounded off with the formation of after-care committees, the District Insurance Committee being the nucleus.

THE WORK OF A COUNTY TUBERCULOSIS OFFICER.

By LEONARD CROSSLEY,

M.D. EDIN.,

County Tuberculosis Officer for Wiltshire; late Medical Superintendent Winsley Sanatorium, Benenden Sanatorium, and Senior Resident Medical Officer Royal National Hospital for Consumption, Ventnor.

THE work of a County Tuberculosis Officer is, on the whole, very similar to that of a Tuberculosis Officer in a town. The duties centre round the dispensaries, and the routine of a tuberculosis dispensary, as originally devised by Sir Robert W. Philip, is now so well known as to make it unnecessary to do more than mention the chief items. These are: (1) The examination and diagnosis (aided by examination of sputum and other tests) of all cases in which tuberculosis is suspected or expected; (2) the selection of suitable cases for domiciliary, dispensary, sanatorium, or hospital treatment; (3) the examination of contacts; (4) the care of patients before and after sanatorium treatment; (5) the visiting of patients in their homes by the dispensary nurses, who advise as to the management of the patient, and instruct the relatives how to prevent infection by the proper disposal of the sputum and the maintenance of hygienic conditions, and especially arrangements for sleeping. The aim of all this is that no case of tuberculosis shall remain undetected and uncared for in the community, and that the right sort of treatment shall be provided for each case.

The practice of a County Tuberculosis Officer extends over a large area (1,354 square miles in Wiltshire), and some special points consequent on this demand consideration.

1. More than one dispensary is necessary. In Wiltshire, as arranged by Dr. Tubb-Thomas, the County Medical Officer of Health, there are three dispensaries situated in the most populous and easily accessible places in the county. At these the Tuberculosis Officer attends to see patients for the greater part of one day each week (two days at one of them), and patients come to see him by train, motor-bus, or carrier-cart, their expenses being paid by the dispensary. This, in my opinion, is a better plan than having a large number of dispensaries with a short attendance at each, as it is better that the time spent in travelling should be that of the patients rather than that of the Tuberculosis Officer. The majority of patients are well able to travel ten or twenty miles to the nearest dispensary; and those acute or advanced cases, for whom twenty miles is too much, are seldom fit to travel at all, and are best seen at their own homes.

2. The actual treatment of patients by the Tuberculosis Officer is limited. Only those patients who can come to the dispensary, and for whom one visit a week is sufficient, can be treated. And even for these provision has to be made for their supervision during the intervals between the weekly visits. Domiciliary treatment under the Insurance Act provides to a certain extent for the insured, but it is difficult to arrange for domiciliary treatment of the uninsured in country districts. For this reason sanatorium accommodation for the uninsured is more necessary than for the insured.

3. The wholesale administration of tuberculin is impossible, and in my opinion this is no loss to the patients. But it can be given when the patients live where they can be under the observation of the dispensary nurses, or are under the care of a doctor who has had some experience of tuberculin. When this is so I give it (bacillary emulsion), to the following groups of cases: (1) Early afebrile cases waiting admission to sanatorium; (2) patients who have been to a sanatorium, have improved, and perhaps are able to resume work, but who still have tubercle bacilli in their sputum; (3) cases with tuberculous glands broken down or not, old tuberculous ulcers, and discharging sinuses. In all these classes of cases I have had very satisfactory results. As a rule, patients too ill to visit a dispensary are not suitable cases for tuberculin; but there are exceptions, and I have seen patients who have been granted domiciliary treatment by the Insurance Committee, who have been treated by their panel doctor, by complete immobilization and tuberculin with admirable results.

4. Great use can be made of open-air shelters, and many patients can be treated in these who would otherwise have to be sent to sanatoria, one of the requisites of treatment in the shape of pure air being always available. These shelters should be sufficiently large to insure a certain amount of comfort and protection from bad weather, but not too large to be easily moved from place to place. They should be placed as near to the patient's home as possible, in case of hæmoptysis, and for obvious sanitary convenience. An intelligent mother, wife, or sister to act as nurse is essential if the patient is an advanced case. Inquiry should always be made as to the means of the patient, as it is no use providing a shelter for a patient who is unable to feed himself sufficiently. An allowance for milk and eggs, and butter is often a great help. Shelters can be used for two classes of patients: (1) Early cases to aid recovery; and (2) advanced cases to prevent spread of infection to other occupants of the house, and to relieve overcrowding, which is often present in country districts. All shelters should be frequently visited by the dispensary nurse, and at intervals by the Tuberculosis Officer.

5. Hospital beds for advanced cases are very necessary in the

country, as, unless the patients happen to live close to the dispensaries, it is impossible to provide adequate medical and nursing attention. These are, of course, the most infectious cases, and it is hopeless to expect to control the spread of tuberculosis unless provision is made for these dangerous cases. In my opinion a hospital for advanced cases should be the first provision made in all schemes for dealing with tuberculosis; unfortunately, it is generally the last.

6. Visiting patients in their own homes takes a good deal of time, and a motor-car is essential. Many of the visits can be paid on the way to and from the dispensaries, different routes being taken out and home; but it is usually necessary to have one day a week for visiting only.

7. The dispensary nurses take an important part in the work, as they are responsible for the dispensaries between the visits of the Tuberculosis Officer.

8. Being appointed by the County Council, and being on the staff of the County Medical Officer of Health, the County Tuberculosis Officer is brought into close relation with the general public health work of the county, and this is a great advantage. He has the help and advice of the County Medical Officer of Health and the assistance of his clerical staff. He is informed of all cases of tuberculosis notified, and is able to report all cases of overcrowding and defective sanitation.

RESORTS AND INSTITUTIONS FOR THE TUBERCULOUS.

THE RURAL OPEN-AIR CAMP AND TUBERCULOSIS DISPENSARY, SOUTHAM, WARWICKSHIRE.

MANY new open-air centres for the prevention and arrest of tuberculosis are now coming into being. One of the most interesting of the recent experiments is situated at "New Zealand," Southam, Warwickshire. The medical superintendent, Dr. J. Pirie, has favoured us with the following account: The Rural Open-Air Camp and Tuberculosis Dispensary is the outcome of an effort begun some two years ago by the resident practitioner at Harbury, near Leamington, to treat by means of "intensive" methods of tuberculin-therapy cases of tuberculosis occurring in his practice, in an extensive rural area, and at the same time to secure to the patient during the major period of treatment efficient segregation, adequate dietary, and plenty of fresh air and sunshine. Owing to financial considerations, capital expenditure and administrative expenses were cut down to the lowest possible amount compatible with efficiency. The enterprise now consists of ten open-air shelters with accommodation for ten patients, and is steadily growing, so that it now serves for the reception, under Local Government Board approval, of patients from outside the original area that it was intended to serve. Only women and children are received as in-patients; male patients attend as out-patients of the dispensary. During the last six months tuberculin treatment has been largely superseded by the use of Contratoxin Serum No. 4 (Mehnarto), which can be used with success even in "mixed infections." The progress of all cases is estimated and the dosage controlled by the honorary hæmatologist, Dr. White Robertson, who employs for the purpose Arneth's method. The medical superintendent is assisted by several consultants on the throat, orthopædic, pathological, and hæmatological sides of the work. A ladies' committee controls the nursing and administrative work of the camp, the honorary secretary being Mrs. Chamberlayne, Stoney Thorpe Hall, Southam, Rugby, to whom applications for admission should be sent. The inclusive fee is 27s. 6d. per week.

MALTINGS FARM SANATORIUM.

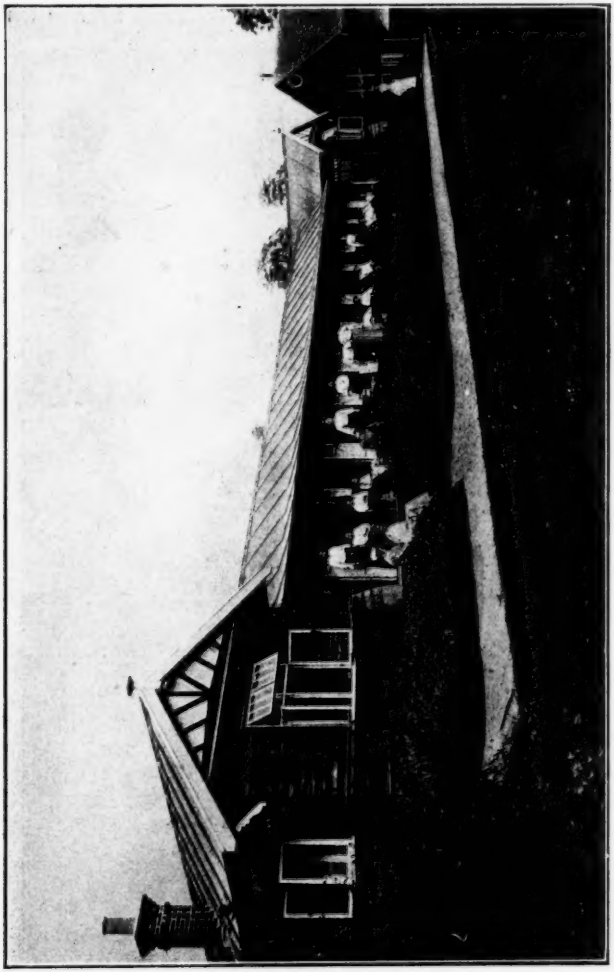
Dr. Jane Walker, the Medical Superintendent of this interesting and most successful institution for the care, education, and treatment, of working-class patients, has kindly favoured us with the following notes: "Maltings Farm Sanatorium is for both men and women patients, and is situated on the East Anglian Sanatorium Estate. Up to 1904 it accommodated sixteen men patients in the farmhouse

and a small bungalow, but in that year money was collected to build a special block for sixteen poor women patients. A beautiful old barn was partially rebuilt and utilized as a dining-hall, while the adjoining farm buildings were modified to form the kitchen and other necessary offices. The total cost per bed worked out at about £110. From time

MALTINGS FARM SANATORIUM: THE INTERIOR OF THE DINING-HALL.

to time a few beds have been added, and in 1911 another block—Illingworth House—was opened to receive another twelve patients. In 1912 further bathroom and lavatory blocks were put up and the kitchen and scullery enlarged. This enabled the numbers to be increased to fifty-one beds. The passing of the Insurance Act brought

a great demand for beds for insured patients of both sexes, and many Committees engaged beds, so that a further extension took place, bringing up the total accommodation to eighty-five. The institution



MALTINGS FARM SANATORIUM: THE WOMEN PATIENTS' BLOCK.

has its own chapel, which adjoins the dining-room, this having been given by the kindness of some friends during 1912. All patients who are fit to do so do work of some kind. There is a French garden where intensive cultivation is carried on, in which the men patients work a varying number of hours, according to their state of health.

This type of garden forms a very good scheme of graduated labour, the work comprising the making of the straw mats which cover the frames and bell-jars at the lightest end of the scale, right through pricking out plants, lifting frames, wheeling a barrow, and so on, up to heavy digging. All men workers are provided with clogs, blue linen trousers, and white coats, as it has been found that this plan prevents the wear and tear to their clothes which is such a serious matter to quite poor people. The women patients work in the gardens immediately round the staff-house, and they wear clogs and blue linen overalls. Those patients who are not working in the garden are employed in the carpenter's shop, where furniture is being made as well as the necessary repairs carried out, while those patients who are only fit for very light work act as orderlies, polish brasses, keep the paths tidy, etc. The educational value of a sanatorium is very high, especially for working-class patients. Though primarily, of course, intended to enable them to regain their health, they learn many things of a social kind that are valuable to them when they leave. For one thing, the promoters of this institution are convinced of the desirability of allowing men and women to meet freely and openly; and with this end in view patients of both sexes meet at meals and in chapel and in recreation unrestrictedly, the only rule being that in their walks not less than three persons may go together. No difficulties on this score have arisen; on the contrary, there have been many advantages. Every attempt is made to give employment to ex-patients. The larger number of both nurses and servants have been patients, also the head of the carpenter's shop and the baker. All these members of the staff are earning their own living and consolidating their health at the same time, and the small amount of extra supervision and care required is amply repaid by the knowledge that so many people are living happy, contented, useful lives in the country who would have gone under in the harder, more strenuous life of a town or city. Moreover, this is getting to be more and more recognized by the patients themselves, and a very large number of them apply to be kept on in whatever capacity the authorities at the sanatorium can use them. So that incidentally there is a growing desire for life in the country in preference to life in the towns which is most encouraging. This institution has been approved by the Local Government Board for the reception of tuberculous patients under the Insurance Act. It is managed by the Board of the East Anglian Sanatorium, of which the Chairman is Mrs. Henry Fawcett, LL.D., and the Medical Superintendent, Dr. Jane Walker. There is a Resident Medical Officer, Dr. Eleanor Soltau. The sanatorium is situated in the lovely "Constable" country; it has a very low rainfall—under 20 inches—and a large amount of sunshine, and the soil is light sand. It is, moreover, in a very sparsely populated part of England, and it is by construction and position suitable for the purpose it is intended to serve." The accompanying illustrations are reproduced from the last Annual Report.

NOTICES OF BOOKS.

TUBERCULIN-THERAPY.

When the King Edward VII. Sanatorium was opened at Midhurst in 1906 it was understood that it was to be not merely a place for the hygienic management of consumptives, but a centre for clinical investigations, and an institute for scientific research: under the able direction of its medical superintendent these purposes have been admirably carried out. The appearance of a preliminary or interim report on the employment of tuberculin in cases of pulmonary tuberculosis provides ample evidence of the truth of this statement.[1] Dr. Bardswell's monograph is a record of painstaking, scientifically designed, and accurately conducted clinical observation and research which should be studied by all medical superintendents of sanatoria, tuberculosis officers, and others engaged in the treatment of consumptives, for it is a model of what an impartial, thorough, and scientifically-conducted clinical investigation should be. The work outlines the main points in tuberculin-therapy, providing directions, suggestions, and warnings regarding the use of tuberculin in all classes of cases. The main portion of the work deals with records and analyses of cases treated with tuberculin at Midhurst. Dr. Bardswell, with true scientific caution, hesitates to formulate anything like a final opinion as to the ultimate value of tuberculin. He, however, concludes that "tuberculin cannot be looked upon as a means whereby an unfavourable case can be converted into a favourable one, or as likely to turn the scale in a patient's favour when his progress is doubtful, and certainly not when it is definitely retrogressive. More often than not in such cases it will do harm. Our experience up to the present time shows that the administration of tuberculin is quite unsuitable as a routine method of treatment for all cases of pulmonary tuberculosis, and that its indiscriminate and careless use on a large scale can only end in harm." The book provides abundant evidence to justify this conclusion. The précis of cases forms a special feature, and there are numerous charts. We particularly commend to the thoughtful study of all tuberculosis officers the suggestive series of notes of "cases treated with tuberculin in private practice and at dispensaries and elsewhere." Professor Karl Pearson's prefatory note is not without interest, although adding but little to the real value of the report, as is evidenced by his final words: "In conclusion, let me observe that the statistical data do not show that obvious and marked advantage of tuberculin treatment which would raise it at once above all suspicion of showing what advantage it does show owing to selection of patients. Correction for selection may show it with a slight

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T. N. KELYNACK, M.D.

THE PREVENTION OF TUBERCULOSIS IN GERMANY.

The last Report of the late Professor Nietner in no way falls behind its predecessors in point of interest, perspicacity, and general excellence.[1] Progress has been maintained on all the different lines of prevention of tuberculosis, and the Report contains no strikingly new features. It may be noted that the specific treatment with tuberculin is steadily gaining ground, both in sanatoria and with the so-called "ambulant treatment." The same applies to the surgical treatment of tuberculosis, as evidenced by the increase in the number of cases of artificial pneumothorax. The new method of thoracoscopy is of valuable service in this connection. In 1912, 59,509 persons died from tuberculosis in Prussia, being 14·49 per 10,000. There were 4,009 lupus patients under treatment in the German Empire. New sanatoria continue to swell the list, especially children's sanatoria. There has also been an increase in the accommodation provided for advanced cases, the Invalidity Insurance Institution of the Rhine Province being particularly active in this respect. The following numbers give an idea of extant institutions: Sanatoria: 149 (15,278 beds, representing 61,000 patients under treatment per annum). Children's sanatoria: 27 (1,200 beds). Homes for surgical tuberculosis: 19 (1,828 beds). Forest camps: 114. Forest schools: 17. Special wards or institutions for advanced cases: 222. Dispensaries: 1,500. Germany is maintaining a foremost position in the Tuberculosis Movement. A special interest attaches to this Report, as it is the last one that will bear Professor Nietner's name on it. He died in Berlin on April 12, at the age of fifty-eight. He had been seriously ill for some months. For ten years Professor Nietner filled the arduous post of General Secretary to the Central Committee. He worked untiringly, and with a devotion to duty that vitalized all he undertook. In a singularly quiet and simple manner he effected much that can hardly be estimated in terms of statistics. Few Germans know the Empire as he did. His journeys were on an enormously wide scale. It was his province to decide upon the feasibility of practical measures of every kind in connection with the prevention of tuberculosis. With his bent towards simplicity and his keen sense of proportion and of harmony between effort and result, his judgment was of inestimable value in all new organizations and schemes. In his quiet way he brought a friendly spirit with him wherever he came, and he shed about him an influence that was of profound significance in moulding public opinion. He understood every social class, and knew on every occasion how to reach his audience. His modesty was very striking. It was difficult to get him to talk about himself, but he had done very arduous work in the field of public health before he became

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General Secretary to the Central Committee for the Prevention of Tuberculosis. As a staff-surgeon of the Medical Department of the War Office he had, in bygone days, been sent to stamp out sporadic outbreaks of cholera and similar pestilences in wild frontier districts, where medical men engaged on such a mission required to be armed with weapons of defence as well as with medical knowledge and experience. He had been an intimate fellow-worker of Koch, in the days when tuberculin was not a commercial product, and Koch and he would spend an hour or two in the day grinding up their tubercle bacilli in an agate mortar. Professor Nietner had a keen appreciation for England, and retained very happy recollections of his association with English colleagues. His great desire was to foster a spirit of mutual help in the campaign against tuberculosis, and he cordially welcomed English inquirers who came to Berlin. Those who met him there will gratefully remember the unfailing courtesy with which he placed his time and his attention at their disposal. It was entirely in keeping with his character that he left directions that his funeral should be conducted in the simplest manner, and that no notice of his death should be published before the funeral had taken place.

E. V. KANTHACK DE VOSS.

THE DIAGNOSIS OF TUBERCULOSIS.

Dr. Clive Riviere is to be congratulated on having written a most useful handbook on the early diagnosis of tuberculosis—a subject which has up till now not possessed a treatise of its own in the English language.[1] The title is noteworthy in that it has raised a term hitherto only heard in the out-patient and post-mortem rooms to the dignity of a clinical conception, the term *tubercle* now being used by the author to denote a tubercular infection of clinical importance. Moreover, he says *early diagnosis* instead of *early tubercle*, thus avoiding the snare of dogmatizing on the early or late origin of adult tuberculosis. The book is divided into two parts, dealing respectively with pulmonary tuberculosis of adults and with tuberculosis of thoracic glands and hilus tuberculosis of children. In each part is then considered first the clinical diagnosis under the separate headings of symptoms, physical signs and differential diagnosis; and, secondly, such special diagnostic tests as Röntgen rays, tuberculin, temperature, and sputum. The arrangement is admirably clear, and lends itself to rapid reference, but the doubt arises in the mind whether tubercle in adults and children need really be separately treated. The two types of disease not merely merge imperceptibly into each other, but are really so closely related that it is often difficult to differentiate the two types at all, and radiography is daily making the distinction more and more difficult. In a future edition of the book, which is certain to be soon required, the author will, perhaps, merge the two parts, adding under each section what features there may be characteristic of each. The author has himself found no royal road to the early diagnosis of tuberculosis, and suggests no short cuts to the clinician. Diagnosis must be made over the old laborious stepping-stones. New methods throw new light

[1] "The Early Diagnosis of Tubercle," by Clive Riviere, M.D., F.R.C.P. Pp. 260. London: Henry Frowde and Hodder and Stoughton. Oxford Medical Publications. 1914. Price 5s. net

on difficult cases, but afford no excuse for dropping the older means of diagnosis. Dr. Riviere is conspicuously fair to the new and the old. The injection of a dose of tuberculin does not replace the necessity for careful percussion. He is well read in German as well as English literature, and it is refreshing to see the methods of apical percussion of Krönig and Goldscheider laid out with such clearness. Stress is laid on the value of light, as opposed to heavy, percussion, with, perhaps, too scant acknowledgment of Sahli's advocacy. Pottenger's interesting observation of the increased tone of muscles to palpation over affected lung is noted, but not the equally characteristic degeneration and flattening of muscle over an older lesion. Many other curious points in percussion are noted, for some of which other explanations might be given, but the author's own suggestions always stimulate the reader to thoughtful study. The section on tuberculin is a long one, and Dr. Riviere admits that the amount of space devoted to it "will be found to correspond more nearly with the claims that have from time to time been made for it than with its actual worth in diagnosis." The author performs a public service in emphasizing once more the essential difference between tubercular infection and tubercular disease, and states very justly that "the value of any particular tuberculin test is no longer a matter of opinion but of ascertained fact." He is able to sum up the information to be obtained from tuberculin under three headings: "(1) the presence of a focal reaction; (2) the exclusion of active disease; (3) the degree of tuberculin sensitiveness." The author calls attention to the possible danger of the focal reaction, giving a graphic chart of a particularly lamentable example, but he considers that harm has been always due to neglect of simple rules which he formulates, and adds: "Dangerous reactions in the hands of experts are rare." Some may join issue with him as to whether the deliberate production of a focal reaction in phthisis is ever justifiable. There is no space within the limits of a brief review to mention more of the interesting points with which the book teems, and it should be read paragraph by paragraph by every practitioner who wishes to diagnose tubercle early. Dr. Riviere is a teacher, and has such important things to say that his plan of saying them twice over and of finally recapitulating is probably justified. It is refreshing to find the first edition of a book so free from slips, typographical and otherwise; even the bibliography is free from verbal error. Author and publishers alike deserve the reader's thanks. EGBERT MORLAND, M.D.

SCROFULOSIS.

The last volume of the "German Tuberculosis Classics," which are being issued in English dress by Messrs. John Bale, Sons and Danielsson, Ltd., on the advice and under the direction of Dr. Egbert Morland of Arosa is Cornet's famous study of "Scrofulosis."[1] The work has been excellently translated by Dr. J. E. Bullock, and is one which should be studied by every tuberculosis officer and all medical practitioners interested in the pathological and clinical features of

[1] "Tuberculosis in Children (Scrofulosis)." By Professor Dr. G. Cornet. Translated from the second German edition by J. E. Bullock, M.D., Assistant Medical Officer, the Eversfield Chest Hospital, St. Leonards-on-Sea. Pp. xii+515. London: John Bale, Sons and Danielsson, Ltd., Oxford House, 83-91, Great Titchfield Street, Oxford Street, W. 1914. Price 15s. net.

tuberculosis. Professor Cornet is an original and independent thinker and investigator, and although his conclusions are by no means generally accepted, his views and opinions are stimulating and merit fullest investigation. Cornet in his elaborate monograph shows that while the discovery of the tubercle bacillus has led to the formation of a truer conception of the nature of tuberculosis, opinions still differ widely as to the pathology of scrofulosis. Cornet definitely distinguishes the following: (1) The tuberculous form due to the tubercle bacillus; (2) a non-tuberculous form caused by other bacteria. "According to our present knowledge they are mostly the staphylococcus (*aureus* and *albus*) or the streptococcus. To simplify the matter I should like to propose the term 'pyogenous form,' but we must always remember that it does not always go so far as the formation of pus, but the process is often arrested in the first stage of inflammatory swelling, and the pus, which is to a certain extent properly a final product, engenders the bacteria which cause it. This term may be used in the same sense as when we class caseating pneumonia as tuberculous, although there are often no typical tuberculous formations. To these we may add: (3) A combination of both processes, the tuberculous and the pyogenous—the mixed form of scrofulosis—the effects of which differ according as the tubercle bacillus or other germs come into play first or simultaneously. How frequently the tubercle bacillus and other bacilli are concerned in scrofulous modifications, in the glands for instance, is shown by the researches of von Brunn, who could prove that in thirty-nine cases of tuberculous neck glands there were streptococci in twenty-eight of them. Therefore scrofulosis is a pyogenous or mixed tuberculous infection arising from a special diathesis (predisposition)." The work deals fully both with the exogenous causes and the endogenous factor, discusses in detail the genesis of all forms of scrofulosis, traces the modes of infection, and indicates the rôle of heredity and environment. The symptomatology is helpfully elaborated, and there are good sections on prognosis and diagnosis. Perhaps the most serviceable sections are those which deal with prophylaxis and treatment. Under the former head the life of the child in the family and at school is fully dealt with; while under the latter open-air management, medicaments, and local treatment are all considered. There is an excellent blibiography extending over seventy-four pages. A work of this kind will be invaluable to tuberculosis officers and other specialists, not only in stimulating thought and arousing discussion, but also by broadening the general outlook and in giving a lift out of conventional furrows.

GENERAL TUBERCULOSIS.

Many will welcome the careful English translation of Professor Cornet's well-known monograph on General Tuberculosis, which has been skilfully prepared by Dr. F. S. Tinker, and just issued by Messrs. John Bale, Sons and Danielsson.[1] The book provides a detailed review of the ætiology, pathology, symptomatology, course, duration, diagnosis, prognosis, and prophylaxis of miliary tuberculosis. Within

[1] "Acute General Miliary Tuberculosis." By Professor Dr. G. Cornet, Berlin and Reichenhall. Translated by F. S. Tinker, B.A., M.B., B.C., M.R.C.S., L.R.C.P., late Senior Resident and Ophthalmic Assistant to the Royal Infirmary, Liverpool. Pp. viii + 107. London: John Bale, Sons and Danielsson, Ltd., Oxford House, 83-91, Great Titchfield Street, Oxford Street, W. 1914. Price 6s. net.

small compass a lucid, suggestive, and serviceable account of the disease has been set forth, and students of tuberculosis will be particularly thankful for the very full bibliography. The monograph is certainly one which all medical practitioners having to deal with tuberculous patients will be well advised to study in its entirety.

MANUALS FOR MEDICAL PRACTITIONERS AND WORKS OF REFERENCE.

Tuberculosis Officers and Medical Superintendents of Sanatoria are expected to be capable organizers and administrators, but it is also essential that they should be reliable clinicians. One of the best manuals of clinical medicine is that which bears the name of Dr. Judson S. Bury, of Manchester. The first edition was issued in 1894, and a new and third edition has recently appeared.[1] It is an ideal work for the senior student and the junior practitioner, and may be strongly commended to all physicians desirous of guidance in up-to-date methods for the examination of cases. The work is dedicated to the President of the Royal College of Physicians. The new edition has undergone thorough revision. A special feature is the excellent exposition of methods for the examination of the deeper structures by means of the Roentgen rays, contributed by Dr. A. E. Barclay, Medical Officer of the X-Ray Department of the Manchester Royal Infirmary. This chapter contains a very full account of investigation of the chest and its contents, and a series of instructive diagrams are provided, indicating the chief features of radiographs of the thorax. The opinion is expressed that "it is in the early cases of phthisis that the X rays are most often requisitioned, and it is in these cases that the difficulties lie. If the chest is normal in all respects, a definite negative diagnosis may safely be given, provided that the radiograph shows no evidence of mottling; and this is the chief difficulty, for there are comparatively few chests among town-dwellers that have not a certain amount of mottling. The difficulty is in the recognition of the importance or otherwise of these localized thickenings in the lungs, for they may be the shadows of old healed foci, or they may be the cause of the symptoms. The points of distinction are that active foci are more indefinite, woolly-looking on the negative, than are the more definite shadows caused by old consolidations, which are naturally more solid in consistency, and show up in greater contrast, not only for this reason, but because the surrounding lung tissue is healthy, and the air enters more freely into it than into the alveoli around an active focus, which are infiltrated for some distance by the inflammatory process." The book contains a very full section on the examination of the respiratory system. Dr. Loveday has assisted in bringing the section on the examination of the blood thoroughly up to date. There is a good description of methods for the examination of sputum, urine, secretions and excretions, and puncture fluids. But while all is good, undoubtedly the best portion of the book is that which deals with the

[1] "Clinical Medicine: A Manual for the Use of Students and Junior Practitioners." By Judson S. Bury, M.D., F.R.C.P., B.Sc., Consulting Physician to the Manchester Royal Infirmary. Third edition. Edited by Judson S. Bury and Albert Ramsbottom, M.D., M.R.C.P., Assistant Physician to the Manchester Royal Infirmary. Pp. xxi + 530, with 305 figures and 10 plates. London: Charles Griffin and Co., Ltd., Exeter Street, Strand, W.C.

examination of the nervous system. The manual is valuable for systematic study, and should be kept at hand for frequent reference.

In the study of tuberculosis and many other general diseases, increasing attention is very rightly being directed to the investigation of the blood. To those desirous for a clear and concise exposition of the best of recent work dealing with the blood-cells, a study of Dr. O. C. Gruner's able monograph may be strongly advised.[1] We particularly commend the work to the notice of tuberculosis officers and those engaged in research work in sanatoria and hospitals for tuberculous cases. An enormous hæmatological field lies unexplored, and there is reason to believe that our understanding of many conditions frequently met with in tuberculous subjects would be greatly extended if systematic examination of the blood were carried out in all cases. Dr. Gruner's book is intended to serve as a companion to the larger textbooks on hæmatology. Particular emphasis is laid upon the relationship between the changes met with in the blood-forming organs and the blood-picture as seen by the clinician. The author specially directs attention to the fundamental unity of design, which is the basis of hæmopoiesis. In a series of well arranged, clearly expressed chapters, the essential features of the various cells of the blood are described. The accompanying fine coloured plates, photographs, figures, diagrams, and excellent tables, add much to the attractiveness and service of the volume. The concluding chapter is a thoughtful study of the cytoplastic phenomena of blood-forming tissues. There is an extensive bibliography, and a very complete glossary of hæmatological terms, together with a workmanlike index. Throughout the author has spared no pains to make his monograph as complete and as helpful as possible. It is a masterly production, and will be indispensable to all investigators of the blood and derangements of blood-tissues.

All physicians dealing with chest cases require to have a clear conception of the new views of cardiac physiology and pathology. These will be found admirably expressed in Dr. Alexander Morison's new monograph.[2] The work deals not only with modern methods and views, but presents the mature judgment of experience extending over thirty years. Dr. Morison, while fully alive to the value of the newer graphic methods of investigation, clearly indicates the service and reliability of the long-tried procedures of inspection, palpation, percussion, and auscultation. He rightly holds that the sagacity and skill of some of our past masters of cardiology have not been surpassed by any recent work. The greater safety, however, which has been secured for the more serious operations of surgery by the life-work of a great Englishman affords the hope that some mechanical impediments to the action of the heart which are beyond the power of the physician to deal with may, by the combined efforts of the physician and surgeon, be more successfully treated now and in the future than has hitherto been

[1] "The Biology of the Blood-Cells: With a Glossary of Hæmatological Terms, for the Use of Practitioners of Medicine." By O. C. Gruner, M.D., Pathologist to the Royal Victoria Hospital, and Assistant Professor of Pathology McGill University, Montreal, Canada. Pp. xii+392, with 75 figures and 7 coloured plates. Bristol: John Wright and Sons, Ltd. 1913. Price 21s. net.

[2] "The Sensory and Motor Disorders of the Heart: Their Nature and Treatment." By Alexander Morison, M.D., F.R.C.P., Senior Physician to the Great Northern Central Hospital, and Physician in Charge of Heart Cases, Mount Vernon Hospital. Pp. viii+261, with 51 illustrations. London: Baillière, Tindall and Cox, 8, Henrietta Street, Covent Garden, W.C. 1914. Price 7s. 6d. net.

possible. The contents of the volume are conveniently arranged in three parts, dealing respectively with the nature of cardiac action, the sensory disorders of the heart, and the disorders of cardiac motion. The book is characterized by a lucidity of expression and grace of style which add much to the intrinsic attractiveness of the subjects dealt with. There are a number of well selected illustrations, and the general get-up of the book is of the best.

A book which will be of particular interest and service to tuberculosis officers and medical superintendants of sanatoria, and one which is to be specially commended to the notice of those who have to deal with children, is Dr. J. J. Nutt's able monograph on "Diseases and Deformities of the Foot."[1] The work has been prepared for the use of medical practitioners desirous of guidance in regard to the management of pedal cases. The book provides a clear account of the anatomy and physiology of the foot and methods of examination, and then follow detailed accounts of the various diseases and deformities affecting the foot. There is a good section dealing with tuberculous disease. The book is thoroughly practical and the numerous illustrations add much to its value as a really serviceable manual.

As every experienced doctor knows, sex matters often loom large in the life of the tuberculous patient. In sanatoria and other institutions for the consumptive, sex problems are constantly arising, and require profound wisdom, sound judgment, sympathy and tact on the part of the medical and nursing staff. A book which every medical superintendent may be advised to study with care is Professor Robert Michels' "Sexual Ethics."[2] It is the latest volume of the well-known and much-appreciated Contemporary Science Series, edited by Dr. Havelock Ellis. The work is a lucid, frank, scientifically expressed exposition of certain selected and pressing problems relating to sex hygiene and ethics which every thinking man and reasonable woman will do well to face. The volume is divided into four parts dealing respectively with: general borderland problems of the erotic life, borderland problems of the extra-conjugal erotic life, pre-conjugal borderland problems, and borderland problems of the conjugal sexual life. The work is one which cannot but greatly assist medical advisers in dealing with some of the most perplexing of problems which have to be dealt with in private practice, and in the care and control of cases undergoing institutional treatment.

Much difference of opinion exists as to the value or otherwise of tuberculin, and to those desirous of guidance the "Plain Rules," prepared by Dr. R. Allan Bennett will be of real service. The author indicates in his preface that he writes as one who believes that tuberculin provides "one of the finest weapons against tuberculosis that we have." Tuberculosis officers should procure a copy of the manual.[3]

[1] "Diseases and Deformities of the Foot." By John Joseph Nutt, B.L., M.D., Surgeon-in-Chief, New York State Hospital for the Cure of Crippled and Deformed Children; Surgeon, Sea Breeze Hospital, etc. Pp. 293, with 4 plates and 101 figures. New York: E. B. Treat and Co., 241-243 West Twenty-third Street. 1913. Price $2.75.

[2] "Sexual Ethics: A Study of Borderland Questions." By Robert Michels, Professor of Political Economy and Statistics at the University of Basle. Pp. xv + 296. London and Felling-on-Tyne: The Walter Scott Publishing Company, Ltd., 1914. Price 6s. net.

[3] "Plain Rules for the Use of Tuberculin." By R. Allan Bennett, M.B. Lond., Physician-in-Charge of the Devon County Council Tuberculosis Dispensary. Pp. 48. Bristol: John Wright and Sons, Ltd. 1914. Price 2s. 6d. net.

In all parts of the country tuberculosis schemes are being elaborated, and for the sake of the general good it is well that the principles and practices adopted in each should be made known. Dr. F. G. Bushnell, the tuberculosis officer for the borough of Plymouth, has been well advised to issue in convenient brochure form a clear statement as to the powers and provisions available and the course to be pursued in the conduct of tuberculosis work in the great centre of the West.[1]

Dr. F. de Havilland Hall's "Lumleian Lectures on Intrathoracic Aneurysm," as reprinted from the *Lancet*, have now been issued in convenient book form. The monograph is one which may well be studied with care by all physicians having to deal with chest cases.[2]

Dr. J. C. Ryan has written a sensible little work on essential measures regarding the personal preservation of health in West Africa. Many white people are now finding employment in this region, and many misleading and dangerous ideas are still circulated by "old coasters." It is shown that for the average European who neglects precautionary measures, West Africa is assuredly a deadly country. "The watchword should be, 'Attend to details.'"[3]

Many have the desire to build a house, but few have the wisdom to know how best to go about it. Mr. G. G. Samson's little work, which has now entered its second edition, is full of reliable information regarding the planning of a hygienic domestic house.[4] The work is thoroughly practical, and may be commended to those who desire to prepare a sanitary home for themselves.

Vichy and its water have won a world-wide reputation. A useful monograph for medical practitioners has been prepared by Dr. C. Cottar, giving full particulars regarding Vichy and its springs, and the various indications and contra-indications of the cure.[5]

Carbon dioxide snow is now being extensively used as a reliable therapeutic agent. Dr. J. Hall-Edwards has prepared an informing brochure regarding methods of collecting, preparing, and applying this new agent in a manner suited to the requirements of the dermatologist and general practitioner.[6] In addition to describing the results obtain-

[1] "Scheme for the Prevention of Tuberculosis and the Treatment of all Persons in the Borough of Plymouth suffering from that Disease." Prepared by F. G. Bushnell, M.D., B.S., D.P.H., Tuberculosis Officer for the Borough of Plymouth. Pp. 58. Plymouth: Underhill and Co. 1914.

[2] "The Lumleian Lectures on Intrathoracic Aneurysm." By F. de Havilland Hall, M.D., F.R.C.P., Consulting Physician to the Westminster Hospital. Pp. 81. London: The *Lancet* Offices. 1914.

[3] "Health Preservation in West Africa." By J. Charles Ryan, L.R.C.P.I., L.M., L.R.C.S.I., L.M., Diplomate in Tropical Medicine, University of Liverpool. With an Introduction by Sir Ronald Ross, K.C.B., F.R.S., Nobel Laureate, M.D., D.P.H., F.R.C.S., D.Sc., LL.D. Pp. xii+96. London: John Bale, Sons and Danielsson, Ltd., Oxford House, 83-91, Great Titchfield Street, Oxford Street, W. 1914. Price 5s. net.

[4] "How to Plan a House: A Book for All about to Build." By George Gordon Samson. Second edition, revised. Pp. xvi+140, with numerous plans. London: Crosby, Lockwood and Son, 7, Stationers' Hall Court, Ludgate Hill, E.C. 1914. Price 2s. net.

[5] "A Treatise on the Mineral Waters of Vichy, for the Use of Practitioners." By Charles Cottar, M.D., Consulting Physician at Vichy. With a Foreword by Vaughan Harley, M.D., Professor of Pathological Chemistry, University College, London. Pp. viii+208+xx. London: H. K. Lewis, 136, Gower Street, W.C. 1913.

[6] "Carbon Dioxide Snow: Its Therapeutic Uses." By J. Hall-Edwards, L.R.C.P., F.R.S.E., Hon. F.R.P.S., Senior Officer in Charge of the X-Ray Depart-

able from the use of carbon dioxide snow, the book contains good descriptions of special apparatus employed in connection with its use. The book is one which will be found to provide just the information and guidance which practitioners require. There is a useful bibliography.

Students of ancient medicine will find much of interest and suggestive value in the scholarly studies of Dr. J. S. Elliott on Greek and Roman medicine.[1] The work provides a general outline of the most important stages in the advancement of the healing art in the two Empires to which modern civilization owes most. The author expresses the hope that his work "may appeal to doctors, to medical students, and to those of the public who are interested in a narrative of the progress of knowledge, and who realize that the investigation of the body in health and disease has been one of the most important features of human endeavour." The book is one of exceptional interest, and it is excellently got up.

Now that many doctors in connection with the supervision of sanatoria and the management of other institutions have to possess skill in organization and administration a knowledge of sound business methods is essential to success. To those on whom fall financial responsibilities the book prepared by Mr. L. R. Dicksee on book-keeping will be of much assistance.[2] This manual is now in its seventh edition, and may be considered beyond the reach of a reviewer's praise. Reference may, however, be made to this practical handbook, for it provides just the information, advice, direction, and practical guidance in the record and classification of business transactions which many medical practitioners stand in need of. The work is one which may also be commended to the notice of the secretaries of hospitals and other charitable and philanthropic institutions.

The products of Messrs. Benger's Food, Ltd., are now so well known and valued as to need no recommendation. The firm, however, has wisely issued a comprehensive monograph on "Alimentary Enzymes" which, while setting forth in detail the physiology of digestion, the employment of predigested foods, the nature of digestive processes in infancy, and much else, provides also explicit instructions regarding the many and varied ways in which Benger's Food and the other Benger preparations may be most advantageously employed.[3] The work is excellently got up, and is illustrated with a fine series of plates—reproductions of fine photographs. We understand a copy of the volume will be supplied to any qualified medical practitioner.

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ment at the General Hospital, Birmingham. Pp. xv+78. London: Simpkin Marshall, Hamilton, Kent and Co., Ltd. 1913. Price 3s. 6d. net.

[1] "Outlines of Greek and Roman Medicine." By James Sands Elliott, M.D., Ch.B., Editor of the *New Zealand Medical Journal*; Hon. Surgeon to the Wellington Hospital, New Zealand. Pp. xii+165, with illustrations. London: John Bale, Sons and Danielsson, Ltd., Oxford House, 83-91, Great Titchfield Street, Oxford Street, W. 1913. Price 7s. 6d. net.

[2] "Book-Keeping for Accountant Students." By Lawrence R. Dicksee, M.Com. F.C.A., formerly Professor of Accounts in the University of Birmingham; now Lecturer at the London School of Economics and Political Science, University of London. Seventh Edition. Pp. xi+246. London: Gee and Co., Ltd., 134, Moorgate Street, E.C. 1913. Price 3s. 6d.

[3] "Alimentary Enzymes in Theory and Application, with Special Reference to their Use in Treatment and Dietetics." Pp. xi+108, with 10 plates. Manchester: Benger's Food, Ltd., New Works.

Among the numerous articles of interest appearing in the last volume of the "Transactions of the American Climatological Association" there are several of special interest to physicians dealing with chest cases[1]: Dr. H. Sewall writes on "The Auscultary Determination of Early Pathological Changes in the Lungs"; Dr. P. King Brown on "The Early Lesions of Tuberculosis in the Lungs"; Dr. J. M. Anders on "The Rôle of Physical Exercise in the Open Air in the Prophylaxis of Tuberculosis"; Dr. C. Floyd on "Artificial Pneumothorax in the Treatment of Chronic Infections of the Pleura and Lungs." Dr. Lawrason Brown seeks to answer the question, "When is a Tuberculosis Patient Cured?" and Drs. H. Lee Barnes and F. T. Fulton provide a "Report of Seventeen Cases of Pulmonary Tuberculosis treated by Artificial Pneumothorax."

"The Sanitary Record and Municipal Engineering Year-Book and Directory," now in its thirty-second year of issue, is an annual which should be on the desk of every medical officer of health, tuberculosis officer, and all other workers in the organization and administration of measures for the care and control of the public health.[2] The volume not only provides an admirable diary interleaved with blotting-paper, but affords an immense amount of valuable information which cannot readily be obtained elsewhere. There is a fairly complete Empire Directory of all municipal authorities and their officials; lists of municipal engineering, public health, and scientific institutions and societies; particulars regarding recent municipal and sanitary legislation, and data of many and varied kinds likely to be of service for reference. The work has been admirably carried out, and must rank among life's indispensables. A copy of the volume we understand is furnished free of charge to every annual subscriber to *The Sanitary Record and Municipal Engineering*.

Sir Henry Burdett's well-known "Year-Book of Philanthropy and the Hospital Annual," now in its thirty-fifth year of issue, still maintains its premier place as our most reliable and up-to-date guide to hospitals and charities.[3] The current issue contains a remarkably complete record of all the more important institutions of the Empire which seek to minister to the sick, afflicted, and needy. There is a fairly good list of "Consumption Sanatoria," and particulars are given of the chief hospitals for consumption and diseases of the chest. The book may now well be counted as a national possession.

Mr. Edward Owen Greening's "One and All Gardening Annual

[1] "Transactions of the American Climatological Association for the Year 1913." Vol. xxix. Edited by Dr. Guy Hinsdale, Secretary of the American Climatological Association, Hot Springs, Virginia, U.S.A. Pp. xxxii + 367. Philadelphia: Printed for the Association. 1913.

[2] "The Sanitary Record and Municipal Engineering Year-Book and Empire Directory of Municipal Officials for 1914." Pp. 204 + Diary. London: The Sanitary Publishing Company, Ltd., 55, 56, Chancery Lane, W.C. 1914. Price 5s. net.

[3] "Burdett's Hospitals and Charities," being the Year-Book of Philanthropy and the Hospital Annual, containing a Review of the Position and Requirements, and Chapters on the Management, Revenue, and Cost of the Charities. An Exhaustive Record of Hospital Work for the Year. It will also be found to be the most useful and reliable guide to British, American, and Colonial Hospitals and Asylums, Medical Schools and Colleges, Nursing and Convalescent Institutions, Consumption Sanatoria, Religious and Benevolent Institutions and Dispensaries. By Sir Henry Burdett, K.C.B., K.C.V.O. Pp. 1054. London: The Scientific Press, Ltd., 28 and 29, Southampton Street, Strand, W.C. 1914. Price 10s. 6d. net.

for Amateurs and all Garden Lovers" is a little volume which should be in the hands of all outdoor workers.[1] We commend it to the notice of all connected with sanatoria and open-air schools. The new issue contains much of interest and service, and includes articles on "Children's Flower Shows" and "Simple Hints for Window Decoration." There are numerous instructive illustrations.

The third part of the last Annual Report of the Local Government Board deals elaborately with tuberculosis and the progress of schemes for dealing effectively with it. Copies of the various official publications relating to the institutional treatment of tuberculosis and Public Health (Tuberculosis) Regulations also appear.[2]

Two volumes of much interest and value have recently been issued by the Local Government Board. In one Drs. A. Eastwood and F. Griffith deal with tuberculous infection in childhood, and Dr. A. Stanley Griffith reports on the relation of bovine and human types of tubercle bacilli as met with in children,[3] while in the other Drs. A. Eastwood and F. Griffith record the results of investigations into localized tuberculosis in swine.[4]

[1] "One and All Gardening, 1914." Edited by Edward Owen Greening, F.R.H.S. Pp. 128. London: The Agricultural and Horticultural Association, Ltd., 92, Long Acre, W.C. 1914. Price 2d.

[2] Forty-Second Annual Report of the Local Government Board, 1912–1913. Part III. Pp. clxiv+312. London: Wyman and Sons, Ltd. 1913. Price 2s. 5d.

[3] Reports to the Local Government Board on Public Health and Medical Subjects (New Series, No. 88). I. The Incidence and Bacteriological Characteristics of Tuberculous Infection in Children. By Arthur Eastwood, M.D., and Fred. Griffith, M.B. II. An Inquiry based on a Series of Autopsies into the Occurrence and Distribution of Tuberculous Infection in Children, and its Relation to the Bovine and the Human Types of Tubercle Bacilli Respectively. By A. Stanley Griffith, M.D. Pp. 166. London: Wyman and Sons, Ltd. 1914. Price 2s. 3d.

[4] Reports to the Local Government Board on Public Health and Medical Subjects (New Series, No. 91). A Report on Localized Tuberculosis in Swine. By A. Eastwood, M.D., and F. Griffith, M.B. Pp. 132. With 3 plates. London: Wyman and Sons, Ltd. 1914. Price 3s.

PREPARATIONS AND APPLIANCES.

THE "QUIDOS" CORK HYGIENIC APPLIANCES.

MR. LEOLINE EDWARDS has introduced a number of ingenious appliances, in which specially manufactured granulated "Quidos" Cork forms an essential element.[1] These clever contrivances for comfort and the preservation of health are well adapted for use by those wishful to live the hygienic and open-air life, and for patients in sanatoria, children in open-air schools, and delicate subjects generally, they may be strongly commended. In a previous issue of this journal we described and illustrated the "Quidos" Life-Saving Chair. We now desire to draw attention to the "QUIDOS" FOLDING BED-REST and also the "QUIDOS" SOFT CORK CUSHION SEATS, MATS, and MATTRESSES. These will be found excellent for use in sanatoria and for all classes of patient undergoing open-air treatment. The Bed-Rest is illustrated in the accompanying figure. The frame is made of birch, varnished and well riveted, and is adjustable in three positions, and when not in use folds up flat, so that it can easily be carried about. It has a green canvas double back, which is sewn across in divisions as shown, each division being filled with "Quidos" soft granulated cork. Being an excellent non-conductor, it does not strike cold to the back of the person resting against it. The canvas at the bottom is supported on a leather strap fixed to the frame, the advantage being that there is nothing hard to press against the back, and the strap itself gives easily, so that great comfort is secured. The whole canvas back can be revolved round if desired. The ends of same are secured by lacing through eyelet holes, and it can therefore be taken up, let out, or removed entirely from the frame. It can be thoroughly cleansed, and even if soaked in water it will dry readily without injury. The Cork Cushion Seats will be admirable for patients sitting out in the open. Each cushion is made of two pieces of green rot-proof canvas sewed together, and between is granulated "Quidos" Cork. This provides a soft, elastic, sanitary non-conductor, which is cool in summer, warm in winter, and also adjustable, portable, and inexpensive.

REQUISITES FOR THE PATIENT.

A new and improved form of sanitary convenience for bed-fast patients, suggested by Sister Hodnett, of West Ham Infirmary, has been introduced by Messrs. Down Bros. under the designation of THE CLEANSABLE URINAL.[2] The chief features of this novel and

[1] Full particulars of the "Quidos" Cork Specialities may be obtained on application to Mr. Leoline Edwards, 81, St. Margaret's Road, Twickenham, Surrey.

[2] The Cleansable Urinal has been registered, and is manufactured only by Down Bros., Ltd., 21 and 23, St. Thomas's Street, London, S.E. Price 30s. per dozen.

very effective form of vessel for the collection of urine is shown in the accompanying figures. Not only for use in the ordinary sick-room and hospital ward, but for patients confined to bed in sanatoria and

open-air shelters these appliances will be of service. This improved model, while not impairing the use of the urinal for collection and retention, provides an additional opening, which will admit the hand or a suitable mop to accelerate thorough cleansing.

For all classes of patients it is essential that suitable means are provided to insure the maintenance of proper warmth. Many patients undergoing open-air treatment suffer unnecessary hardship through the lack of hygienic clothing, protection from wind, and want of appliances for the preservation of bodily heat. Many forms of warmers in rubber, pottery ware, or metal, are now available, and are extensively used in sanatoria and for patients undergoing open-air treatment at home, in institutions, or elsewhere. A particularly convenient and inexpensive form of COPPER WARMER has been recently introduced by Messrs. Boots.[1] The Boots' Copper Hot-Water Warmer is a strong, well-polished, conveniently shaped, non-rusting vessel, which will go far to displace the old-fashioned, clumsy stone bottles often met with. It is provided with a well-fitted screw stopper and a neat handle, and is portable, durable, and remarkably cheap. For use by all classes of tuberculous subjects, this scientifically designed warmer is to be thoroughly recommended. It only needs to be tried to be appreciated.

THE BOOTS' COPPER HOT-WATER WARMER.

Where electric power is available in the home or in the hospital and sanatorium, the new RUGBY ELECTRIC BED-WARMER, invented by the London and Rugby Engineering Company, Ltd., will be found a real luxury. Many patients undergoing open-air treatment would greatly appreciate one of these ingenious contrivances. The Warmer consists of a metal case of polished copper or nickel-plated, within

[1] The Boots' Copper Hot-Water Warmer is supplied by Messrs. Boots, the head offices of which firm are at Station Street, Nottingham. The prices are 1s. 6d. and 2s., according to size.

which is a lamp of special design. There is a simple key switch, whereby the current can be easily turned on or off. The metal case can be enclosed in a woollen bag when used by the patient. Overheating cannot occur, and a comfortable, uniform temperature is constantly maintained. There are no metal heating elements or wires which can fuse or give trouble. The Warmer is economical in use, as but little current is used, equal only to that of an 8-candle-power lamp. It can be connected with any wall-plug or lamp-holder, and is supplied to meet any voltage. The general appearance of this clever contrivance is shown in the accompanying illustration.[1]

THE RUGBY ELECTRIC BED-WARMER.

Persons living the open-air life, whether on prophylactic grounds or as a part of serious therapeutic treatment, must give heed to the

THE WAY-A-HEAD SLEEPING AND OUTDOOR CAP.

important matter of clothing. Fortunately materials are now available whereby patients of all ages and both sexes may be hygienically equipped for outdoor living. Our attention has recently been directed to the ingenious and most effective SLEEPING AND OUTDOOR CAPS introduced by the Way-a-Head Company.[2] The caps allow of ample adjustments, as indicated in the accompanying illustrations. They are made in white Canton flannel at 75 cents and in corduroy at $1.50, and can be obtained in three sizes. Having tested this clever head-covering, we can strongly recommend it as a most useful adjunct to equipment for the open-air life.

[1] Full particulars of the Rugby Electric Bed-Warmer can be obtained on application to the makers, the London and Rugby Engineering Company, Ltd., 10, Bush Lane, Cannon Street, London, E.C. The price is 19s. 6d. polished copper, and 22s. 6d. nickel-plated.

[2] The Sleeping and Outdoor Caps above illustrated have been patented by the Way-a-Head Company Incorporated, of Carthage, Illinois, U.S.A.

Attention has recently been directed to so-called tuberculous rheumatism. This condition seems to be rare, although forms of muscular and arthritic rheumatism are frequently met with in patients undergoing open-air treatment. For such cases the new ASPIRIN-SOLUBLE introduced by the Bayer Company, Ltd., will be found of much service.[1]

Arsenic has often been claimed to be of service in the treatment of certain cases of tuberculosis. "ELARSON" is a new organic arsenical compound which seems to deserve thorough investigation. It is said to be the strontium salt of chlor-arseno-behenolic acid. It is an amorphous powder, tasteless and almost colourless, insoluble in water, and only with difficulty soluble in alcohol, ether, and olive-oil. It contains about 13 per cent. of arsenic.[2]

SOLUBLE SALTS OF EMETINE are now being recommended in the management of hæmoptysis in tuberculous cases. Emetine hydrochloride and Emetine hydrobromide have been introduced, and preparations for hypodermic injections can be obtained in ampoules.[3]

Reference may here be made to the fact that the editor of this journal has undertaken the editorial oversight of a new annual which should prove of much assistance to all interested in the organization and administration of tuberculosis measures, and those working for child welfare. The forthcoming "Year Book of Open-Air Schools and Children's Sanatoria," will be a companion volume to the "Tuberculosis Year Book and Sanatoria Annual." It will be issued shortly, and tuberculosis officers and school medical officers and all responsible for the conduct and support of institutions for the open-air education of children, should send full particulars at once to the publishers of the new Year Book.[4]

[1] Specimens and particulars of "Aspirin-Soluble" may be obtained on application to the Bayer Company, Ltd., 19, St. Dunstan's Hill, London, E.C.

[2] Particulars regarding "Elarson" can be obtained from the manufacturers, the Bayer Company, Ltd., 19, St. Dunstan's Hill, London, E.C.

[3] Full particulars regarding the new Emetine preparations can be obtained on application to Messrs. Whiffen and Sons, Ltd., Battersea, London, S.W.

[4] "The Year Book of Open-Air Schools and Children's Sanatoria," will be issued very shortly by Messrs. John Bale, Sons and Danielsson, Ltd., 83-91, Great Titchfield Street, Oxford Street, London, W. Price 7s. 6d. net.

NOTES.

THE ROBERT KOCH SOCIETY.

THIS journal exists to assist all rational movements making for the co-ordination of all forms of tuberculosis work, the co-operation of workers, and the co-relation of State movements with philanthropic and voluntary efforts. We are therefore glad to insert the following note received from Dr. Theodore B. Sachs relative to the formation of an Association of Physicians for the Study of Tuberculosis, which shall bear the name of "The Robert Koch Society for the Study of Tuberculosis": "A study of the existing anti-tuberculosis machinery in various cities discloses the absence of special physicians' associations for the study of the medical side of the problem. The lack of such associations as would bring together, at stated intervals, medical men interested in tuberculous disease for the purpose of discussion seems to be a grave omission in the general scheme, considering the importance of the medical profession as a factor in the anti-tuberculosis movement. There are a large number of medical questions pertaining to tuberculosis on which the collective judgment of the profession can be formulated only through continuous discussion and study. To meet this need, all Chicago physicians connected with tuberculosis sanatoria, hospitals and dispensaries, as well as medical men interested in the study of the disease, were invited, under the auspices of the Chicago Tuberculosis Institute, to a luncheon on February 11, 1913, at the City Club, at 12 noon, to attend the first meeting of the so-called Tuberculosis Study Circle. It was planned that the time between 12.15 p.m. and 1 p.m. be given to the luncheon, and the hour between 1 and 2 to the presentation of some important medical phase of tuberculosis by someone who has made a thorough study of it. These meetings proved to be exceedingly popular, bringing together for the first time, at regular intervals, physicians interested in the study of tuberculosis. The following points were learned in the course of experience of the last ten months, which are probably important in connection with the organization of such associations: (1) Do not waste time in preparation of elaborate by-laws and constitutions. Get a man well posted on a certain phase of the disease, and announce him as speaker for the first meeting. Prepare the by-laws later. (2) Best time for meetings of physicians is the lunch hour. Lunch from 12.15 to 1 p.m.; address and discussion from 1 to 2. Adjournment promptly at 2. Meetings once a month. (3) Bar written papers; notes permissible. Subject should be thoroughly handled by a well-posted man. We are now in our tenth month of existence, and it is very evident that our organization has done a great deal of good in the direction of adjusting differences of opinion, stimulating study, and bringing closer together the medical men interested in tuberculosis. After our next meeting the organization will have a new name, that of The Robert Koch Society for the Study of Tuberculosis. So far seven meetings have been held since February 11, 1913. The subjects presented were as follows: (1) 'The Chemio-Therapy of Tuberculosis,' by Dr. Gideon Wells, of

the University of Chicago; (2) 'In What Class of Cases should we use Tuberculin, particularly in Dispensary Practice?' a general discussion by all present; (3) 'The Treatment of Pulmonary Tuberculosis with Artificial Pneumothorax,' by Dr. W. A. Gekler, of the Indiana State Sanatorium, Rockville, Indiana, formerly assistant to Dr. Brauer of Marburg; (4) 'Some Phases of Immunity with Special Reference to Tuberculosis,' by Dr. Ludwig Hektoen, of the University of Chicago; (5) 'Experience with Tuberculin,' by Dr. Charles L. Minor, Asheville, North Carolina; (6) 'Pneumothorax in the Treatment of Pulmonary Tuberculosis,' by Dr. John B. Murphy, of the North-Western University Medical School; (7) 'The Present Status of Tuberculin-Therapy,' by Dr. Louis Hamman, of the Johns Hopkins University. Attendance at these meetings averaged from 55 to 85. It may be desirable that the plan we put in operation in Chicago should be studied by medical men in other cities. A greater adjustment of views of the medical profession on the subject of tuberculosis, as well as a further incentive to study of this widespread disease, is greatly needed. One last word of advice: Be sure that the physicians' association is affiliated with your local anti-tuberculosis organization, and through that with the National Anti-Tuberculosis Association."[1]

A POPULAR MUSEUM.

Mrs. E. v. Kanthack de Voss has kindly supplied us with the following interesting paragraph:

"Dr. Karl Dohrn has prepared an excellent handbook for the Wander-Museum.[2] The museum has a threefold object. It is designed to educate public opinion regarding tuberculosis, infant mortality and declining birth-rate, and alcoholism. The Hanoverian Association has materially helped to spread a net of tuberculosis dispensaries over the entire province of Hanover, embracing the remotest rural districts. There are at present forty-five dispensaries in the province, and every year adds to their number. In 1912 the Association paid out £1,230 in grants to dispensaries, in addition to supporting the sanatorium Heide Haus, near Hanover, which contains 200 beds for patients in every stage of tuberculosis, the accommodation being provided in separate pavilions. The museum is excellently planned, readily transportable, and has become a popular institution in the province. It contains 227 exhibits. The German infant mortality figure is very high. It is 17·6 per cent., only being exceeded in Europe by Russia, 27·2 per cent., and Austria, 23·1 per cent., the English figure being 11·8 per cent. There has, however, been a noteworthy decrease in recent years. On the whole, infant mortality is higher in the rural districts in Germany than in the towns. The birth-rate has declined in Prussia from 165·4 in 1890 to 129·5 in 1911. The decline is not so marked in rural districts, but is steady there also. In the Catholic parts of Germany the decline is less marked. The towns keep up or increase their population by depleting the agricultural districts. Germany requires a very large amount of foreign labour, and the amount

[1] Those interested in the above proposal would do well to communicate with Dr. Theodore B. Sachs, at 15, East Washington Street, Chicago, Illinois, U.S.A.

[2] "Guide to the Wander-Museum of the Hanoverian Association for the Prevention of Tuberculosis." 7th edition. By the Secretary, Dr. Karl Dohrn. Pp. 90. Hanover, 1914.

is increasing. In 1909-10 there were 375,000 foreign agricultural labourers employed, and 268,000 industrial workers. In 1911-12 there were 397,000 agricultural and 332,000 industrial labourers. Dr. Dohrn points out that it is futile to advocate the raising of large families from ideal motives unless it can also be shown that the rearing of large families for the State is a profitable investment. In addition to the tuberculosis dispensaries, there are in Hanover eight anti-alcohol dispensaries. Outdoor pastimes are strongly encouraged as the best counter-attraction to the 'Kneipe.'"

FOREST SCHOOLS IN GERMANY.

Forest schools had their origin in Germany, and the Fatherland is evidently determined to keep itself to the front in regard to these admirable hygienic institutions. Mrs. E. V. Kanthack de Voss of Hamburg has sent us the following interesting note: "A Prussian capitalist has recently given £250,000 to the city of Berlin and £50,000 to Charlottenburg for the erection of forest schools for boys, such schools to bear the name of Repphan Foundation Forest Schools. During his lifetime the trust is to pay him a yearly income of £9,000, and, after his death, £4,500 per annum to his widow. The schools are to be erected at least sixty kilometres from Berlin, preferably in the Harz Mountains. The principal feature of the tuition is to be the teaching of natural science and modern languages. Classes are to be held in the open air as often as practicable, and the pupils are to sleep outside except in bad weather. During the holidays extensive peregrinations, in charge of a teacher, are to be organized, in order that the pupils may gain first-hand knowledge of their own country. It is left to the Berlin authorities to decide whether the schools are to be free or whether a moderate fee is to be charged. It is calculated that 800 to 1,000 boys will be able to benefit by this munificent foundation, a small fee being charged."

INTERNATIONAL SYSTEM OF STETHOSCOPIC ABBREVIATIONS.

It is most desirable that clinicians should adopt some system whereby reliable comparisons may be made in records prepared and published in various parts of the world. The following international system of stethoscopic abbreviations, proposed by Professor Saugman of Vejlefjord, was recommended by the Fifth Commission of the International Anti-tuberculosis Association at the Tenth International Conference in Rome in 1912. The system was definitely adopted by the Eleventh Conference in Berlin in October, 1913, and is likely now to take its place in international medical nomenclature. We adopt the form as given in the *Glasgow Medical Journal* for January, 1914:

d.	Dexter	Rechts	Droit	Right
s.	Sinister	Links	Gauche	Left
a.	anterior	vorne	antérieur	anterior
p.	posterior	hinten	postérieur	posterior
sup.	superior	oben	supérieur	superior
inf.	inferior	unten	inférieur	inferior
C.	costa	Rippe	côte	rib
C_2 etc.	costa II etc.			
interc.	spatium intercostale	Zwischenrippenraum	espace intercostal	intercostal space
Cl.	clavicula	Schlüsselbein	clavicule	clavicle

Pap.	papillula mammæ	Papille	mamelon	nipple
Sp.	spina scapulæ	Schultergräte	épine de l'omoplate	spine of scapula
Ang.	angulus scapulæ	Schulterblattwinkel	angle de l'omoplate	angle of scapula
½ Sc.	medio scapulæ	Mitte der Reg. infraspinata	au milieu de la région sous épineuse	middle of infraspinous region of scapula [1]
—	usque ad	bis zu	jusqu'à	up to
Th.	Thorax			
applan.	applanatus	abgeflacht	aplati	flattened
dilat.	dilatatus	ausgedehnt	dilaté	dilatated
retard.	retardatus	nachschleppend	retardant	slowed
Margo	margo pulmonis	Lungenrand	limite du poumon	lungs border
mobil.	mobilis	beweglich	mobile	movable
immobil.	immobilis	unbeweglich	immobile	immovable
M.[2]	mutitio, mutus	Dämpfung	matité	dulness
Tymp.	tympanismus	Tympanic	tympanisme	tympanitic sound
Met.	metallia	Metallklang	résonnance metallique	metallic sound
Resp.	respiratio	Atmung	respiration	respiration
Insp.	inspiratio	Einatmung	inspiration	inspiration
Exsp.	expiratio	Ausatmung	exspiration	expiration
ves.	vesicularis	vesikulär		
bronch.	bronchialis	bronchial	souffle bronchique	bronchial
amph.	amphoricus	amphorisch	souffle cavitaire	amphoric
sacc.	saccatus	saccadiert	saccadé	cog wheel
prolong.	prolongatus	verlängert	prolongé	prolonged
forte.	fortis	verschärft	exagéré	strong
dim.	diminutus	abgeschwächt	affaibli, diminué	diminished
RL[3]		grossblasiges Rasseln	gros râles	coarse râles
Rl[3]		mittelblasiges Rasseln	râles moyens	moderate râles medium râles
rl[3]		kleinblasiges Rasseln	râles fins	fine râles
( )		nur nach Husten zu hören	après la tous seulement	only after coughing
(Rl_1)		spärliches mittelblasiges Rasseln, nur nach Husten zu hören etc.	râles peu nombreux moyens, perceptibles seulement après la toux etc.	few medium râles only after coughing
sicc.	siccus	trocken	sec	dry (râles)
cons.	consonans	klingend	consonnant	tinkling
crep.	crepitans	crepitierend	crépitant	crepitant
subcrep.	subcrepitans	subcrepitierend	souscrépitant	subcrepitant
craq.		knackend	craquements	crackling
rh.	rhonchi	Rhonchi	râles	rhonchi
frict.	frictio	Reiben	frottements	friction
Frem.	fremitus vocalis	Stimmfremitus	vibrations vocales	vocal fremitus
Brph.	bronchophonia			

[1] Correction of original translation.—Ed. *G.M.J.*

[2] All quantitative variations of phenomenon are indicated by the figures 1 to 3 added to the principal sign, the number 1 to represent the minimum degree and the number 3 the maximum of the said phenomenon. For example, M_1 M_2, M_3, signify slight dulness, marked dulness, and complete dulness; Rl_1, Rl_2, Rl_3—few râles, several râles, and many râles, and so forth.

[3] Please note the meaning of the capital and small letters.

CLASSIFICATION OF CASES IN TUBERCULOSIS CLINICS.

The Association of Tuberculosis Clinics in the United States have adopted a new classification of cases and results of treatment, as recommended by the National Association for the Study and Prevention of Tuberculosis (U.S.A.) at its last annual meeting. The new classification has been adopted by most American departments of health from January 1, 1914, and presents many advantages over the old. The differences are shown in the subjoined table:

CLASSIFICATION OF PATIENTS ON EXAMINATION.

OLD.	NEW.
1. *Incipient* (*Favourable*).—Slight initial lesion in the form of infiltration limited to the apex of a small part of one lobe. No tuberculous complications. Slight or no constitutional symptoms (particularly including gastric or intestinal disturbances or rapid loss of weight). Slight or no elevation of temperature or acceleration of pulse at any time during the twenty-four hours, especially after rest. Expectoration usually small in amount or absent. Tubercle bacilli may be present or absent.	1. *Incipient.*—Slight or no constitutional symptoms (including particularly gastric or intestinal disturbances or rapid loss of weight). Slight or no elevation of temperature or acceleration of pulse at any time during the twenty-four hours. Expectoration usually small in amount or absent. Tubercle bacilli may be present or absent. Slight infiltration limited to the apex of one or both lungs, or a small part of one lobe. No tuberculous complications.
2. *Moderately Advanced.*—No marked impairment of function either local or constitutional. Localized consolidation moderate in extent, with little or no evidences of destruction of tissue or disseminated fibroid deposits; no serious complications.	2. *Moderately Advanced.*—No marked impairment of function, either local or constitutional. Marked infiltration more extensive than under incipient, with little or no evidence of cavity formation. No serious tuberculous complications.
3. *Far Advanced.*—Marked impairment of function, local and constitutional. Localized consolidation intense, or disseminated areas of softening, or serious complications.	3. *Far Advanced.*—Marked impairment of function, local and constitutional. Extensive localized infiltration or consolidation in one or more lobes, or disseminated areas of cavity formation, or serious tuberculous complications.

CLASSIFICATION OF SUBSEQUENT OBSERVATIONS.

OLD.	NEW.
Cured.—All constitutional symptoms and expectoration with bacilli absent for a period of two years under ordinary conditions of life.	*Apparently Cured.*—All constitutional symptoms and expectoration with bacilli absent for a period of two years under ordinary conditions of life.
Apparently Cured.—All constitutional symptoms and expectoration with bacilli absent for a period of three months, the physical signs to be those of a healed lesion.	*Arrested.*—All constitutional symptoms and expectoration with bacilli absent for a period of six months, the physical signs to be those of a healed lesion.
Arrested.—Absence of all constitutional symptoms; expectoration and bacilli may or may not be present; physical signs stationary or retrogressive; the foregoing conditions to have existed for at least two months.	*Apparently Arrested.*—All constitutional symptoms and expectoration with bacilli absent for a period of three months, the physical signs to be those of a healed lesion. *Quiescent.*—Absence of all constitutional symptoms; expectoration and bacilli may

Improved. — Constitutional symptoms lessened or entirely absent; physical signs improved or unchanged; cough and expectoration with bacilli usually present.

Progressive (*Unimproved*).—All essential symptoms and signs unabated or increased.

or may not be present; physical signs stationary or retrogressive, the foregoing conditions to have existed for at least two months.

Improved. — Constitutional symptoms lessened or entirely absent; physical signs improved or unchanged; cough and expectoration with bacilli usually present.

Unimproved.—All essential symptoms and signs unabated or increased.

RECORDS OF PROGRESS.

A Medical Research Committee to administer the funds made available under the National Insurance Act for the purposes of research has been constituted by regulations issued last week as follows: Lord Moulton of Bank (chairman); Dr. Christopher Addison, M.P.; Mr. Waldorf Astor, M.P.; Sir T. Clifford Allbutt, Regius professor of physic, University of Cambridge; Mr. Charles John Bond, senior honorary surgeon, Leicester Infirmary; Dr. William Bulloch, bacteriologist to the London Hospital and professor of bacteriology in the University of London; Dr. Matthew Hay, professor of forensic medicine and public health, Aberdeen University; Dr. Frederick Gowland Hopkins, reader in chemical physiology in the University of Cambridge. Brevet-Colonel Sir William Boog Leishman, professor of pathology, Royal Army Medical College. An Advisory Council of Research is also constituted, to consist at the outset of the following: Lord Moulton of Bank (chairman), Miss L. B. Aldrich-Blake, M.D., Sir W. Watson Cheyne, Sir William S. Church, Dr. Sidney Coupland, Mr. David Davies, M.P., Dr. Sheridan Delépine, Sir James Kingston Fowler, Sir Rickman J. Godlee, Sir Alfred Pearce Gould, Dr. David Hepburn, Dr. E. C. Hort, Dr. Arthur Latham, Sir John McFadyean, Dr. W. Leslie Mackenzie, Dr. J. C McVail, Dr. W. J. Maguire, Dr. S. H. C. Martin, Dr. Robert Muir, Dr. Alexander Napier, Sir George Newman, Dr. Arthur Newsholme, Dr. J. M. O'Connor, Sir William Osler, Dr. A. C. O'Sullivan, Dr. Marcus S. Paterson, Sir Robert W. Philip, Sir William H. Power, Dr. H. Meredith Richards, Dr. Lauriston E. Shaw, Dr. Albert Smith, Dr. J. Lorrain Smith, Mr. T. J. Stafford, Dr. T. H. C. Stevenson, Mr. Harold J. Stiles, Sir Stewart Stockman, Dr. W. St. Clair Symmers, Miss Jane Walker, M.D., Dr. Norman Walker, Dr. J. Smith Whitaker, Sir Arthur Whitelegge, and Dr. G. Sims Woodhead. It is laid down that the Medical Research Committee shall from time to time prepare schemes for research, including, if they think fit, scheme for inquiries and the collection and publication of information and statistics, and shall submit such schemes to the chairman of the National Health Insurance Joint Committee, who before approving any scheme so submitted will consult the Advisory Council for Research. Members of the Research Committee are to hold office for three years.

The Local Government Board has supplemented its memorandum of February 25, 1913, on the design of sanatoria by a further memorandum, prepared with a view to affording local authorities and others assistance in the provision of special residential institutions in connection with permanent schemes for the treatment of pulmonary tubercu-

losis.[1] The unit taken in setting out the details has been 100 beds in buildings, with ten additional beds in shelters. A series of block plans accompany the memorandum.

The Local Government Board for Scotland has issued model schedules for the record of tuberculous cases.[2]

On the recommendation of the Committee on the Award of the Hodgkins Prize of $1,500 for the best treatise "On the Relation of Atmospheric Air to Tuberculosis," which was offered by the Smithsonian Institution in connection with the International Congress on Tuberculosis held in Washington in 1908, the Institution announces that the prize has been equally divided between Dr. Guy Hinsdale, of Hot Springs, Virginia, for his paper on "Tuberculosis in Relation to Atmospheric Air," and Dr. S. Adolphus Knopf, of New York City, for his treatise "On the Relation of Atmospheric Air to Tuberculosis."

The issue of the *Indian Medical Record* for December last formed a "Special Tuberculosis Number."[3] Among the articles contributed by British writers was one by the Editor of this journal on "Tuberculosis: An Imperial Problem."

Dr. A. Philip Mitchell's striking study of tuberculous infection of children by bacilli of the bovine type has been issued in pamphlet form.[4]

Dr. J. A. D. Radcliffe's Weber-Parkes prize essay on "Mixed and Secondary Infections in Pulmonary Tuberculosis," is now published as a brochure.[5]

The Summer Conference of the National Association for the Prevention of Consumption will be held at Leeds, July 8.[6]

The Twelfth International Anti-Tuberculosis Conference will meet at Berne from September 14 to 16.[7]

[1] Memorandum on Provision of New Residential Institutions for the Treatment of Pulmonary Tuberculosis. Signed by Arthur Newsholme, Medical Officer to the Board, and Brook Kitchin, Architect to the Board. London: Local Government Board. February, 1914.

[2] Forms of Record for Cases of Tuberculosis treated in Institutions approved by the Local Government Board in Terms of Section 16 of the National Insurance Act, 1911. Edinburgh: Local Government Board. January 14, 1914.

[3] The *Indian Medical Record* is published by A. C. Bisharad, 2, Horokumar Tagore Square, Corporation Street, Calcutta; and can be obtained in London from Messrs. Baillière, Tindall and Cox, 8, Henrietta Street, Covent Garden, W.C.

[4] "Report on the Infection of Children with the Bovine Tubercle Bacillus." By A. Philip Mitchell, C.H.M., M.D., F.R.C.S. Reprinted from the *British Medical Journal*, January 17, 1914. London: Printed at the Office of the British Medical Association, 429, Strand, W.C. 1914.

[5] "Mixed and Secondary Infections in Pulmonary Tuberculosis," reprinted from *Zeitschrift für Tuberkulose*, Bd. xxi, Hf. 1, 2, and 3. Leipzig: Johann Ambrosues Barth, 1913.

[6] Full particulars may be obtained on application to Dr. J. J. Perkins, Hon. Secretary, the National Association for the Prevention of Consumption, 20, Hanover Square, London, W.

[7] Full particulars can be obtained from Professor Dr. Pannwitz, the Hon. Secretary-General of the International Anti-Tuberculosis Association, Schöneberger Ufer 13, Berlin, W., 35 Germany.